GE Fanuc Automation

CIMPLICITY® Monitoring and Control Products

CIMPLICITY HMI Plant Edition

Tracker

Routing Control Objects Operation Manual

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Following is a list of documentation icons:

Warning notices are used in this publication to emphasize that hazardous voltages, currents, temperatures, or other conditions that could cause personal injury exist in the equipment or may be associated with its use.

In situations where inattention could cause either personal injury or damage to equipment, a Warning notice is used.

Caution provides information when careful attention must be taken in order to avoid damaging results.

Important flags important information.

To do calls attention to a procedure.

Note calls attention to information that is especially significant to understanding and operating the equipment.

Tip provides a suggestion.

Guide provides additional directions for selected topics.

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Preface

Contents of this Manual

Chapter 1. Introducing Routing Control Objects: Introduces CIMPLICITY HMI Routing Control Objects.

Chapter 2. Learning about RCO: Provides an overview of the Routing Control Objects module and interface requirements.

Chapter 3: Configuring Routing Control Objects: Discusses the RCO Configuration Wizard and Provides instruction on configuring RCOs.

Chapter 4. Using the RCO Runtime User Interface: Discusses the options available in the Routing Control Objects user interface.

Chapter 5. RCO Logging Configuration: Documents the configuration for ODBC data logging of RCO information.

Chapter 6. Function Blocks Overview: Introduces the function blocks used by RCO.

Chapter 7. Routing Function Blocks: Documents the routing function blocks for RCO.

Chapter 8. Core Function Blocks: Documents core function blocks for RCO.

Chapter 9. Output Function Blocks: Documents the output function blocks for RCO.

Chapter 10. Conditional Function Blocks: Documents the conditional function blocks for RCO.

Chapter 11. Diagnostic Blocks: Documents the diagnostic blocks for RCO.

Chapter 12. PRT Function Blocks: Documents the Production Tracking function blocks for RCO.

Chapter 13. Include Function Blocks: Documents the include function blocks for RCO.

Appendix A. RCO External Decision: Documents the RCOExtDec Application Programmer Interface (API) .

Related Publications

For more information, refer to these publications:

CIMPLICITY HMI User's Manual (GFK-1180)

Contents

Introducing Routing Control Objects 1-1

About Routing Control Objects 1-1
Upgrade RCO Projects 1-2

Learning about RCO 2-1

About the Routing Control Objects Module 2-1
RCO Overview 2-6
RCO Execution Sequence 2-7
Advanced RCO Concepts 2-8
RCODB_RP Process 2-10
Glossary for RCO Manual 2-11

Configuring Routing Control Objects 3-1

About the Tracker Configuration User Interface 3-1
Using the Execution Sequence to Your Advantage 3-2
Open the Tracker Configuration User Interface 3-3
Tracker Configuration User Interface Overview 3-5
How to Create Routing Control Objects 3-7
RCO Configuration Tasks 3-8
Step 1. Configure a Routing Control Site 3-9
Step 2. Configuring Triggers 3-25
Step 3. Configuring Decisions 3-28
Step 4. Configuring Routing Logic 3-32
Locking Operation 3-35
Save RCO Configuration Data 3-36
Additional Functions and Utilities 3-37
RCO Folder Properties 3-37
Attribute Maintenance 3-39
Region Maintenance 3-40
Verify Utility 3-43
Error List Utility 3-43
Alarming and Logging 3-44

Using the RCO Runtime User Interface 4-1

About the RCO Runtime User Interface 4-1
Connect the RCO Runtime User Interface 4-2
Option 1. Connect to Local Project 4-2
Option 2. Connect to Projects in an Existing RCO Profile 4-4
Option 3. Connect to Projects from the Command Line 4-5
Option 4. Connect to the Configuration Dialog 4-7
Select the Control Site 4-9
RCO_UI Window 4-10
Open Profile 4-14

Configure a Profile 4-15
Manually Create an RCO Profile 4-18
Additional Functions for an RCO Site 4-20
Changing the Status of a Control Site 4-21
Managing Decisions 4-23
Managing Triggers 4-26
Searching for Control Sites 4-30
Setting Alarming and Logging Options 4-31

RCO Logging Configuration 5-1

Overview 5-1
Database Logger Tables for RCO 5-1
Database Logger Table Fields for RCO 5-1
RCO Logging Configuration Files 5-3
Datalog.idt 5-3
Data_field.idt 5-4

Function Blocks Overview 6-1

About RCO Function Blocks 6-1

Routing Function Blocks 7-1

Balance Load 7-1
Block by Attribute 7-4
Check Item Hold Status 7-6
Check Process Capability 7-10
Check Region Full 7-13
Check Region Ready 7-14
Consume a Trigger 7-17
Eliminate by Weight 7-18
Eliminate Decision Based on Attribute Spacing 7-19
Eliminate Decision Based on Rule 7-22
Eliminate Decisions Based on Region Status 7-27
Eliminate Decision by Attribute 7-28
Eliminate Decision by Attribute Attribute 7-28
Eliminate Decision by Attribute Point 7-31
Eliminate Decision by Attribute Value 7-33
Eliminate Decision by Increasing Weight Percentages 7-35
Eliminate Decision by Point 7-38
Eliminate Decision by Point Point 7-38
Eliminate Decision by Point Value 7-40
Eliminate Decision if not only Decision 7-42
Eliminate Decision 7-43
Eliminate Decisions with no Items in Source 7-44
Get Trigger Name 7-46
Item Type Translation 7-47
Look Back Blocking 7-48
SelectDecisionByAttribute 7-50
Select Decision by Attribute Point 7-50
Select Decision by Attribute Value 7-53
Select Decision by Point Value 7-55
Select Decision with Highest Order & Weight 7-57
Select Decision 7-58
Select Highest Order Decision 7-59
Select Lowest Order Decision 7-60

Select Most Empty Region 7-61
Select Most Full Region 7-62
Select Next Highest Order Decision 7-63
Select Oldest Item 7-64

Core Function Blocks 8-1

Append a Decision in ExtDecBuffer 8-1
Clear the Cached Items 8-1
Consume a Trigger 8-2
Custom Block 8-2
Delete at a Decision in ExtDecBuffer 8-3
Delete a Decision in ExtDecBuffer 8-4
Exit Sub 8-4
Fill Array Point 8-5
Fill RCO Array Point 8-5
Flush the ExtDecBuffer 8-6
Get Decision Attribute 8-6
Get Decision Status 8-7
Get Ext Decision List 8-7
Get Production Data 8-7
Increment Attribute 8-8
Increment Point 8-8
Insert a Decision in ExtDecBuffer 8-9
Logstatus Generator 8-9
Region Full Check 8-10
Request External Decisions 8-10
Reset a Trigger 8-11
Select next External Decision 8-11
Set Array Point 8-12
Set Attribute 8-12
Set Attribute to Text and Integer 8-12
Set Attribute with Attribute 8-13
Set Attribute with Point 8-14
Set Attribute with RCO Variable 8-14
Set Attribute with Value 8-14
Set Auto-trigger Interval 8-14
Set Decision Attribute 8-15
Set Decision Status 8-16
Set Point with Attribute 8-17
Set Point with Point 8-17
Set Point with Timestamp 8-18
Set Point with Value 8-18
Set RCO Variable with Attribute 8-19
Set RCO Variable with Expression 8-21
Set RCO Variable with Point 8-21
Set RCO Variable with a Special Value 8-22
Set RCO Variable with Timestamp 8-22
Set RCO Variable with Translate Value 8-23
Set RCO Variable with Value (Extended) 8-24
Set RCO Variable with Value 8-24
Set Wait Encountered Flag 8-25

Output Blocks 9-1

Attribute Counts ... 9-1
Conditional Alarm with Attribute ... 9-3
Conditional Alarm with Point ... 9-3
Generate Alarm ... 9-4
Process Bits & Words ... 9-5
Set Asynch Validation Value ... 9-6
Update Counts ... 9-7
Update Spacing, Attribute and Total Released Counts ... 9-10

Conditional Function Blocks 10-1

Case Block ... 10-1
Case Else Block ... 10-2
Check all Region's (related to Decisions) Status (Extended) ... 10-2
Check all Region's (related to Decisions) Status ... 10-4
Check if any Source Region has Decision ... 10-5
Compare Attribute ... 10-5
Compare Attribute with Attribute ... 10-6
Compare Attribute with Point ... 10-9
Compare Attribute with Value ... 10-11
Compare Point with Point ... 10-13
Compare Point with Value ... 10-15
Compare RCO Variables ... 10-17
Else Block ... 10-19
Else If (Expression) ... 10-19
End If ... 10-20
End Select Block ... 10-20
End While ... 10-21
If (Expression) ... 10-21
Select Block ... 10-23
While (Expression) ... 10-25

Diagnostic Blocks 11-1

Dump Available Decisions ... 11-1
Site Log Generator ... 11-2

PRT Function Blocks 12-1

Add PRT Item ... 12-1
Associate Item ... 12-2
Delete Item ... 12-4
Disassociate Item ... 12-4
Load PRT Item into Item Variable ... 12-5
Load PRT Region Data into Region Variable ... 12-5
Move Item ... 12-6
Set PRT Item Data ... 12-7
Set PRT Item with another PRT Item ... 12-8
Set Source Region as Decision Made ... 12-10

Include Function Blocks 13-1

Include File ... 13-1

Appendix A - RCO External Decision **A-1**

Overview ... A-1
RCO External Decision API Functions ... A-2
ExtDec_api_init ... A-2
ExtDec_api_get_msg ... A-3
ExtDec_api_init_comm ... A-4
ExtDec_api_send_decision ... A-4
ExtDec_api_term ... A-5
RCOExtDec API Calls in relation to PDC_API Calls ... A-5
External Decision Simulator ... A-6
Set 1. Framework Functions (ExtDec_Sim ... A-6
Set 2. Data Management and Event Handler Functions (ExtDec_SimData.cpp) ... A-7
Set 3. RCO External Decision API Calls ... A-9
Process Flowchart ... A-9
Simulator Configuration Requirements ... A-10
External Decision Buffer ... A-17
RcoDecisionBuffer ... A-17
RcoExtDecision ... A-21

Index **i**

Introducing Routing Control Objects

About Routing Control Objects

The Routing Control Objects (RCO) Module is one of two modules that make up the **Tracker** product option. This application module is fully integrated with CIMPLICITY HMI software's base system functionality to enhance its already powerful monitoring ability in a full range of computer-integrated manufacturing environments.

The Base System functionality—Point Management, Alarm Management, Database Logging facilities, and a full-functioned User Interface—enables you to collect data for reporting and to view data in lists, graphic status displays, and alarms. The RCO module also has the ability to integrate with many of the industry-standard data communications products.

The Routing Control Objects Module is a flexible factory floor tool that provides:

- Records of production counts at workstations.
- Graphic monitoring of automatic data point values.
- Fault reporting through direct point values and alarms.

CIMPLICITY HMI's flexible system architecture and modular design allows you to easily add-on options for enhanced functionality. The Routing Control Object module of the Tracker option coordinates the flow of material within a production facility.

Note: This manual is not intended to provide instruction on CIMPLICITY HMI or your Windows operating system, and it is assumed that users have a working knowledge of both software products. Please refer to the documentation that originally came with your software for questions about CIMPLICITY and Microsoft Windows.

Upgrade RCO Projects

Whenever you install the latest upgrade to your CIMPLICITY software, it is a good idea to upgrade your RCO projects. This will enable you to take advantage of the enhancements offered in the Service Pack or CD release. For example, the RCODB_RP process, which is the database server for RCO_UI clients, can only be started after you upgrade your RCO projects.

To upgrade RCO project:

1. Open your project in the CIMPLICITY Workbench.
2. Double-click the **Tracker Configuration** icon to open the Tracker Configuration User Interface.
3. Right-click a folder in the RCO directory.
4. Select Lock in the popup menu (if not already checked).

   A check mark appears next to Lock; the folder is locked.
5. (*If Activate is not checked when you checked Lock*) right-click the folder again.

. Select Activate.

   A check mark appears next to Activate; the project is activated.
7. Verify the project using one of the following methods.

   Method 1–Toolbar button

   Click on the Tracker toolbar.

   Method 2–Menu option

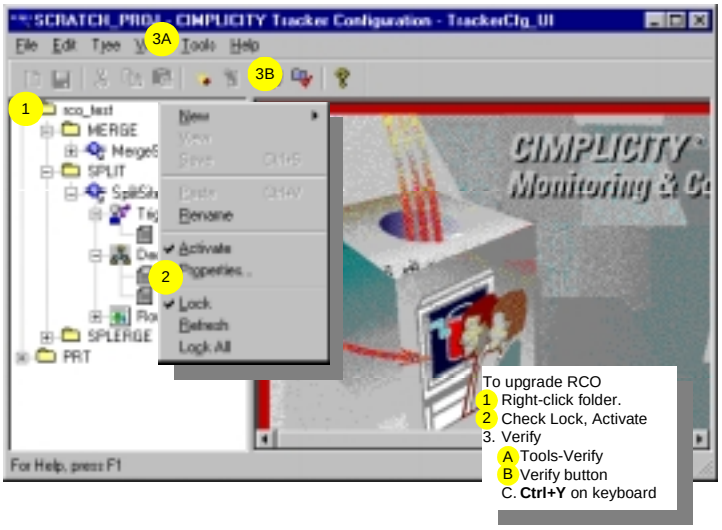
   A. Click Tools on the Tracker menu bar.

   B. Select Verify.

   Method 3–Keyboard

   Press **Crtl+Y** on the keyboard.

Result: The RCO project is updated and enhancements are available.



Learning about RCO

About the Routing Control Objects Module

The ***Routing Control Objects*** (RCO) module is one of two modules that make up the CIMPLICITY Tracker software option. The other module is the ***Production Tracking*** (PRT) module, which tracks parts / assemblies through the manufacturing process. This module requires the configuration of a tracking model that is supported by a powerful database which tracks a product from the inception of raw materials on the factory floor to finished goods. The RCO module works in tandem with PRT, using its data to perform enhanced production routing decisions at runtime.

Wherever a routing decision has to be made on the factory floor, an RCO will monitor the site and make decisions based on current production conditions. Each routing site monitored by an RCO is called a ***control site***.

User Interfaces

There are two interfaces associated with the RCO module:

Tracker Configuration User Interface	Used for creating and configuring all of the components related to a control site.
RCO Runtime User Interface	Used for monitoring runtime data of a control site. Also used for manual intervention, e.g. manual decision.

RCO Components

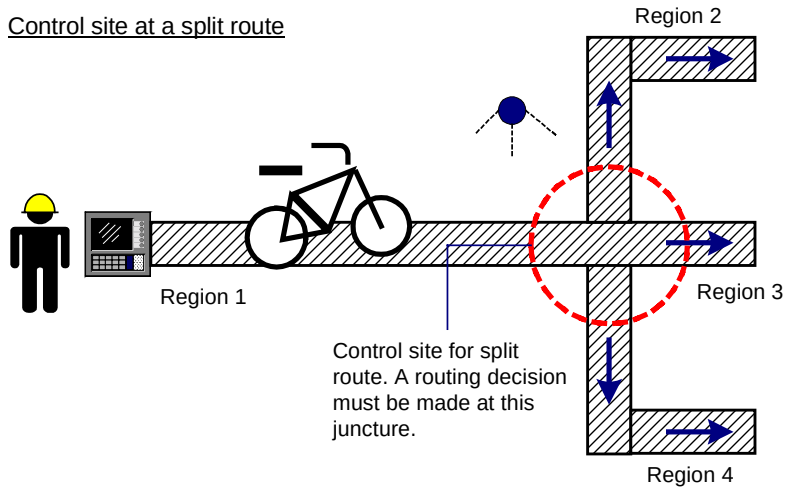
There are several components that are integral to the creation, configuration, and implementation of a routing control object, each of which are explained in the following sections:

- Control Site
- Triggers
- Decisions
- Function Blocks
- Routing Logic Modules

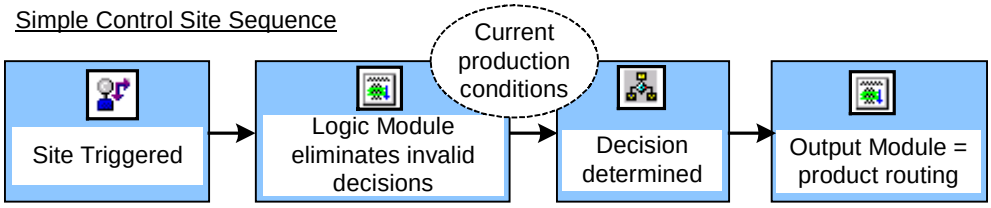
See the Tracker Getting Started Guide, GFK-1694 for complete details about configuring a Tracking Model.

Control Site

A ***control site*** is a location in the factory where a production routing decision must be made.


Control site at a split route
Region 2
Region 1
Region 3
Region 4
Control site for split route. A routing decision must be made at this juncture.

Events at a control site have a domino-like effect as follows:

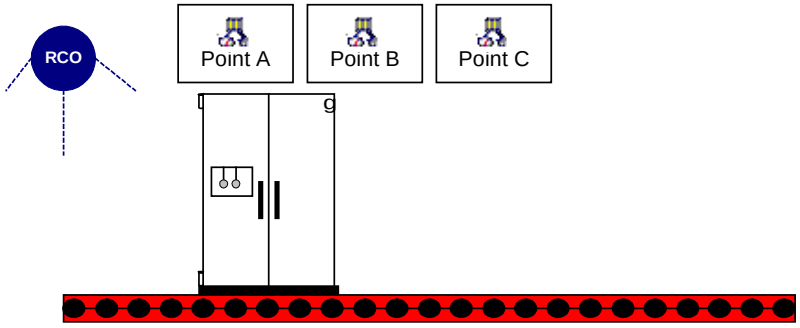


Triggers

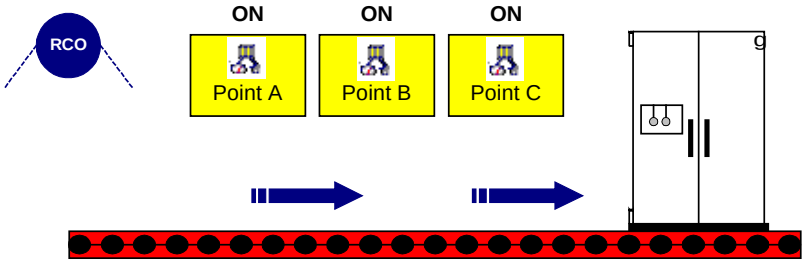
A ***trigger*** initiates the cycle of events at a control site. A trigger is commonly one or more configured points. When a group of points are configured to trigger a control site, they must be triggered in the correct sequence to start the cycle of events.

Example

1. Points A, B and C must trigger in sequence to send refrigerator to next region.



2. Points A, B and C. trigger in sequence starting the cycle of events at the control site.



Decisions

A ***decision*** is made at a control site in the factory based on current production conditions. RCO uses "decision-based logic" to execute production routing. This means that unlike traditional software where the outcome is determined after conditions have been evaluated decisions are determined in advance. Therefore, all possible outcomes are known in advance and eliminated based on the configured routing logic for the current production conditions.

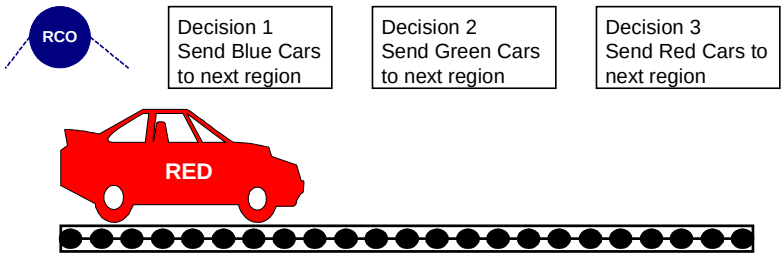
After the Logic Module ends, RCO determines which decision to execute as follows:

Possible Remaining Decisions	RCO Executes
One	That decision
None	None script
Multiple	Multiple script

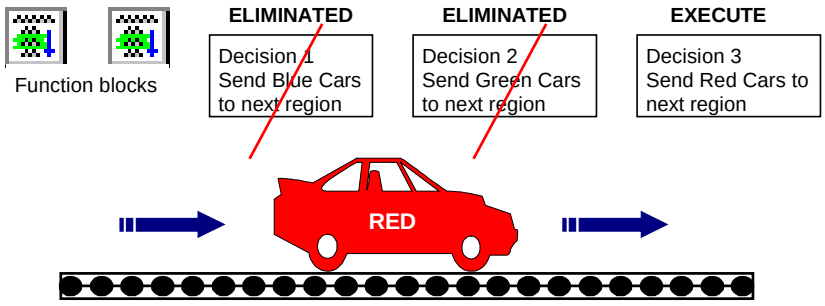
The control cycle is ended when RCO detects that the decision is either successfully or unsuccessfully completed.

Example

1. All possible decisions are known in advance



2. Configured function blocks eliminate decisions based on current production conditions



Red car is sent down the line to the next region.

Function Blocks

Function blocks are standard logic routines from which you create logic modules for routing product, generating errors, disabling the control site, and so on. You set the parameters on each function block so that it meets your specific needs in the production environment. Further, two or more function blocks can be grouped together to meet your production criteria.

There are an abundant number of function block templates to choose from in various categories as follows:

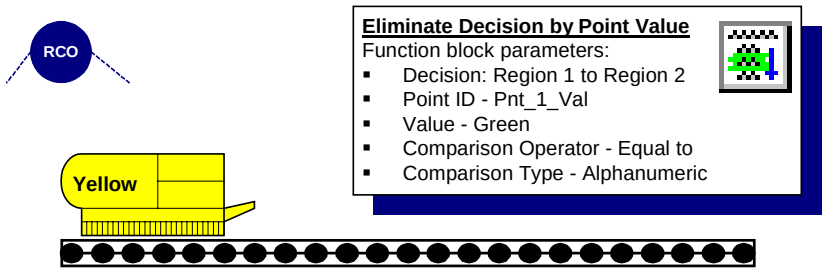
Function block	Description
Conditional	Evaluates 'If-Then-Else' conditions
Core	Performs all-purpose function
Diagnostic	Assists in resolving RCO issues
Include	Enables the inclusion of a file into the generated script.
Output	Produces an output in the system, for example generating an alarm
PRT	Performs PRT functions
Routing	Performs routing functions

Routing Logic Modules

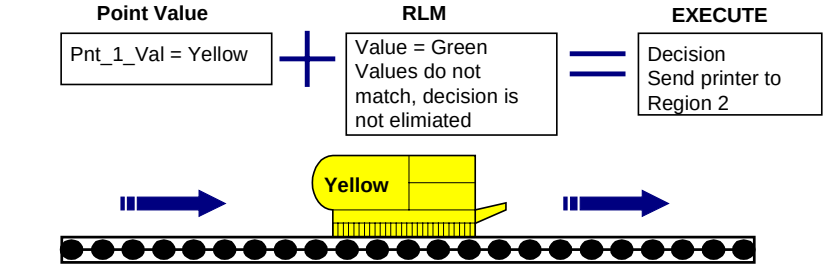
A ***Routing Logic Module*** (RLM) is one or more function blocks configured to achieve a particular routing result. When using the function blocks provided with the Tracker software option, you set the parameters using dialogs in the Tracker Configuration User Interface. There is no need to write code to achieve routing results, the function blocks automate the entire process for you making this a highly effective feature of the RCO subsystem.

Example

1. Site is triggered and an RLM is run with a single function block.



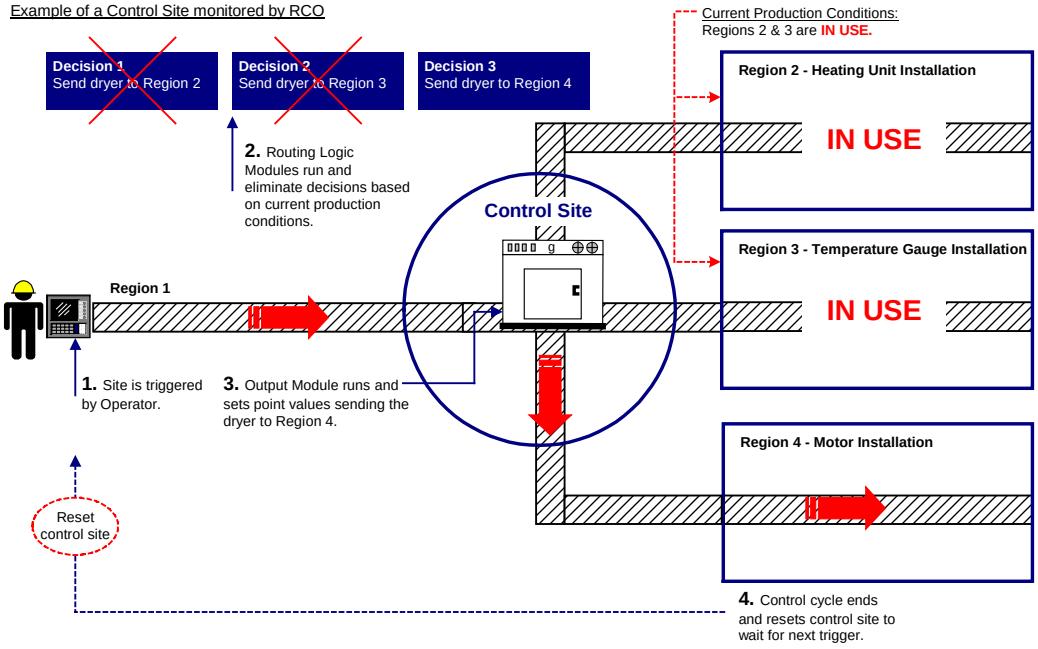
2. RLM is matched against the point value and decision is executed.



Printer is sent to Region 2

RCO Overview

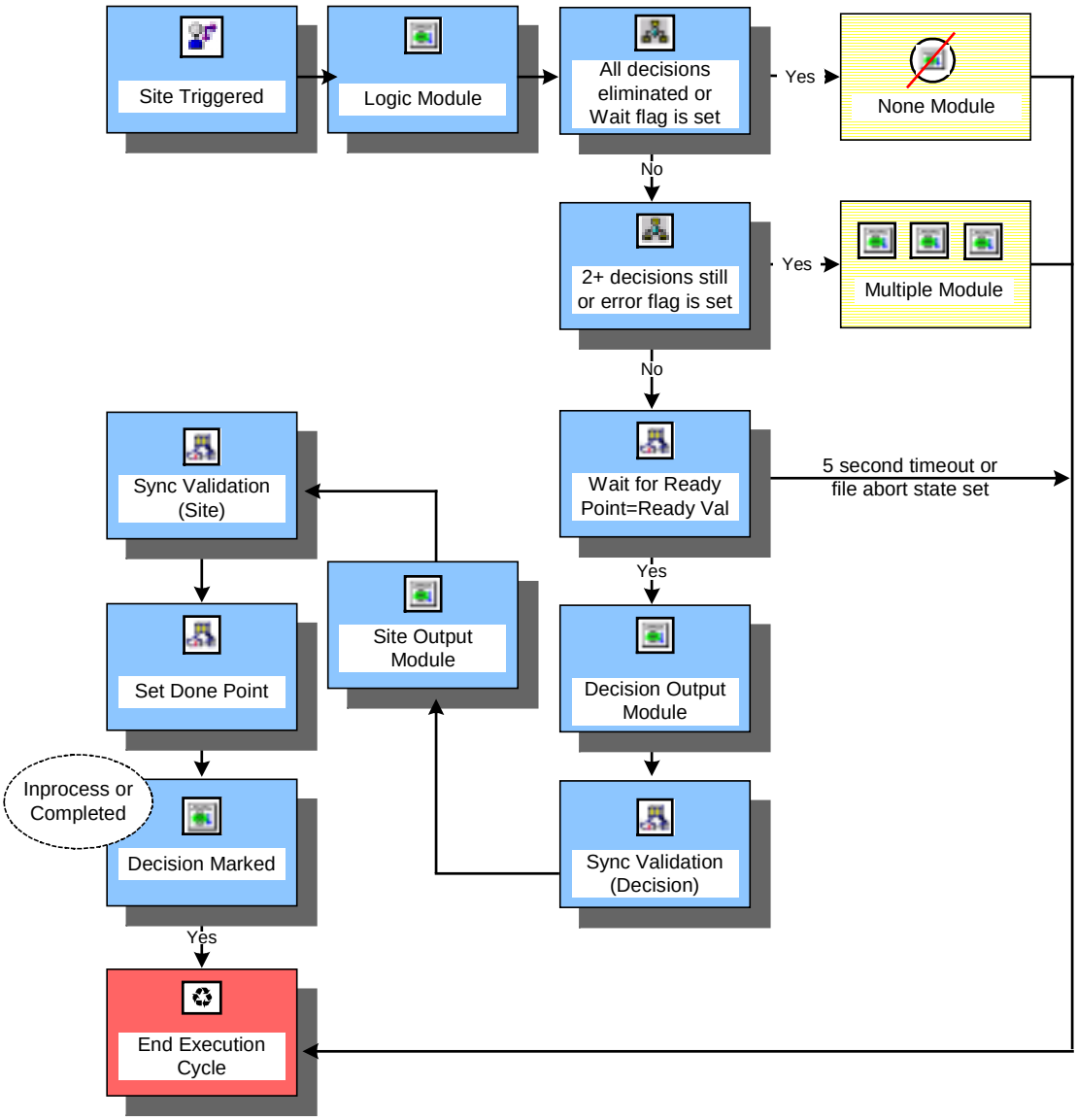
RCO is an independent process that monitors control sites on the factory floor. Like a traffic cop directing traffic, RCO directs the flow of product through the manufacturing environment using 'decision-based logic'. The following diagram is a simple rendition of a control site monitored by an RCO on the factory floor:


Example of a Control Site monitored by RCO
Current Production Conditions:
Regions 2 & 3 are IN USE.
Decision 1
Send dryer to Region 2
Decision 2
Send dryer to Region 3
Decision 3
Send dryer to Region 4
Region 2 - Heating Unit Installation
IN USE
2. Routing Logic Modules run and eliminate decisions based on current production conditions.
Control Site
Region 3 - Temperature Gauge Installation
IN USE
Region 1
1. Site is triggered by Operator.
3. Output Module runs and sets point values sending the dryer to Region 4.
Region 4 - Motor Installation
Reset control site
4. Control cycle ends and resets control site to wait for next trigger.

RCO Execution Sequence

The logic used by RCO to execute decisions is illustrated in the flowchart below.

RCO Execution Sequence



Advanced RCO Concepts

In order to configure the control sites in your facility so that they operate based on your criteria for production flow and existing production conditions, it is important to learn about the advance RCO concepts.

This section describes:

- Synchronous validation
- Asynchronous validation

Control site: Synchronous validation

Synchronous validation occurs during the control cycle to verify that a carrier has arrived at the stop position and allows the control site to stay in synchronization with the factory floor.

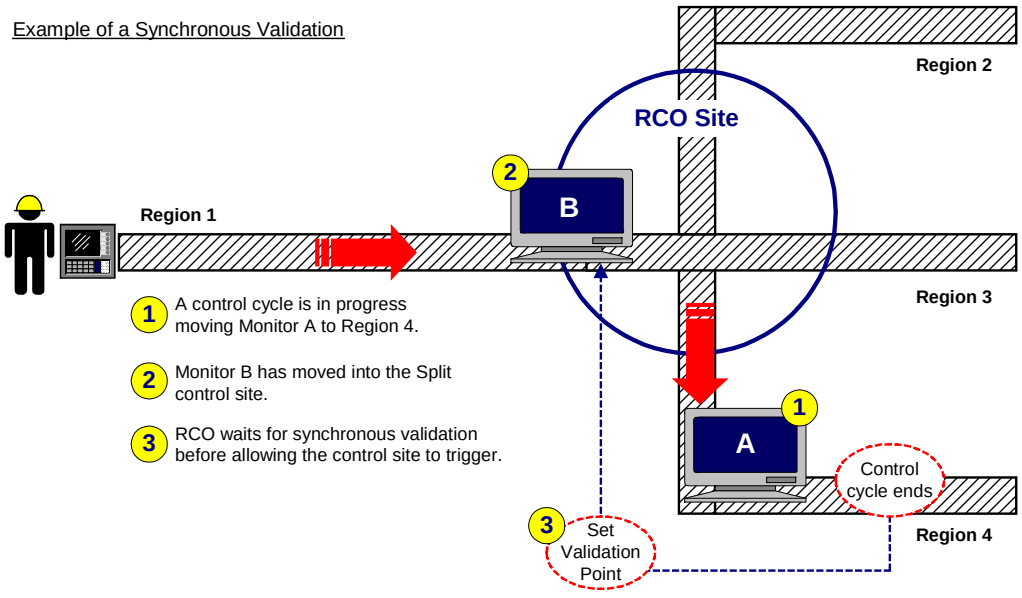
Configuration Guidelines

In the Tracker Config UI, the following fields are configured to enable synchronous validation:

Dialog	Group Name	Field Name	Value
Control Site	Execution Sequence	Verification Point	Point ID
		Verification Value	Boolean, integer or string

See "Configuring Routing Control Objects" chapter in this manual for details about configuring points and point values for an RCO.

Example of a Synchronous Validation



Control site: Asynchronous validation

Asynchronous Validation enables RCO to wait on one or more Validation points while continuing to execute additional control cycles. This means that when a control cycle is in progress, the control site can be triggered (to start a new control cycle) while waiting for the Verification point to set and to mark the decision 'Complete'.

Decisions

Each decision has two additional fields: Validation Point and Default Validation Value. The Validation Point must be set to the Validation Value in order for the decision to be considered complete. With Asynchronous Validation, RCO will continue to execute control cycles while waiting for validation to occur.

When the logic module has selected a decision, the output modules will run and the decision will appear in the RCO_UI as 'Pending'. If the decision has a Validation Point configured, the site will wait for the Validation, and process any additional triggers. The decision waiting for validation will be marked as 'InProcess' until the Verification.

RCO maintains a history of the last 32 decisions. When a new decision is made, it is added to the decision history. When the maximum number of configured decisions is exceeded, the oldest decision is removed from the list. RCO alarms if a decision is removed and was not validated.

Once a decision has been removed from the list, it is considered canceled.

Decision Complete

When Async Validation is configured for a decision, and the default value is specified in the Decisions dialog box or in the Output Module via the Set Asynch Validation Value function block, the decision status reads, 'InProcess'. When RCO receives a Point update whose value is equal to the configured Validation Point, the decision is then marked 'Completed'.

Configuration Guidelines: When configuring Decisions for an RCO, set the Validation Point and designate a value in the Val. Point Value field. If these fields are not configured, the decision will not wait for a validation Point to be updated, and the decision will be marked as complete at the end of the cycle. *See topics, "How to Configure Decisions," and "How to Create a Routing Control Object—Output Modules Group" for instructions.*

Use the Set Async Validation Value function block to change the default value for a particular cycle. You can assign the value or tie it to a variable. Configure this function block in the output module only. Note that if the default value is not configured in the Decisions dialog box, but is configured in the output module using the above-mentioned function block, the decision will wait for the validation Point to be updated with the value assigned in the function block for completion.

The site must have a thread available for performing async validation. Set the thread count accordingly in its folder's properties. *See "RCO Folder Properties" for details.*

RCODB_RP Process

The RCODB_RP Process supplies the details of the RCO sites configured in a project to any requesting RCO Runtime UI process. The RCO configuration data is stored in a SQL server database to which this process will have an open connection in order to retrieve information and deliver to the requesting process.

Glossary for RCO Manual

Take a moment to become familiar with the terms listed below as they will be used throughout this manual.

Asynchronous Validation

Asynchronous Validation enables RCO to wait on one or more Validation points while continuing to execute additional control cycles. This means that when a control cycle is in progress, the control site can be triggered (to start a new control cycle) while waiting for the Verification point to set and to mark the decision 'Complete'.

Decisions

A decision is an action you configure to be performed by an RCO at a control site. Decisions typically represent a transition from one tracking region to another but may also represent other actions such as tracking updates, set Points, or alarms. Decisions are defined for an RCO under the **Decisions** branch of the RCO configuration tree.

Folders

Folders are used in the RCO Configuration directory to organize control sites and they represent the "process" that runs under Windows NT. Each folder is responsible for executing the control sites it contains. Although folders may appear within folders, a folder will not execute any folders it contains. Folders under folders are a separate process. Under the Windows NT Task Manager, folders appear as a process called "RCOSite" Under CIMPLICITY HMI program control, they show up with the name of the actual folder.

Function Blocks

Function blocks are standard logic routines provided with the Tracker product that may be configured in logic modules to perform decision-making logic.

Merge Route

Many routes to one route.

Output Logic

Output Logic performs the output actions required based on the current decision and current factory conditions. Output Logic may contain one or more function blocks or a custom Basic Control Engine (BCE) program.

Route

A link between two regions in the manufacturing process.

Routing Control Objects (RCO)

Routing Control Objects (RCOs) may be configured to perform routing control, process setup, and tracking updates based on current factory conditions. RCOs can be configured for any number of locations in the production process.

Routing Logic

Routing Logic determines the best decision to make from all configured decisions based on current factory conditions. Routing Logic is arranged and managed in components called Routing Logic Modules. Routing Logic is defined for an RCO under **the Routing Logic** branch of the RCO configuration tree.

Routing Logic Module (RLM)

A Routing Logic Module is logic configured to achieve a particular routing result such as color blocking or load balancing across several lines. An RLM may consist of one or more function blocks or a custom Basic Control Engine (BCE) program.

Simple Route

Part/assembly follows one route.

Splerge Route

Many routes to many routes.

Split Route

One route to many routes.

Synchronous Validation

Synchronous validation requires the control cycle in progress to complete before the site can be triggered and a new cycle initiated. Two or more control cycles cannot run simultaneously at a control site with synchronous validation.

Tracker Configuration User Interface

The Tracker Configuration User Interface enables you to configure RCOs for specific control sites through a graphical user interface. A new RCO will automatically generate a Triggers, Decisions and Routing Logic applet, which are represented in a tree directory similar to Windows Explorer directory and file structure. When you click on an applet in the directory, a corresponding dialog for configuring and viewing RCO data is displayed in the left pane of the window.

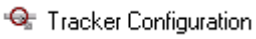
Triggers

A trigger initiates an RCO control cycle. A trigger may be configured as one Point that on update initiates the control cycle or several Points that on update (in the correct sequence) initiate the control cycle. Several triggers may be configured at a Tracker Control Site. Triggers are defined for an RCO under the Triggers branch of the RCO configuration tree.

Configuring Routing Control Objects

About the Tracker Configuration User Interface

The Tracker module provides you with two subsystems for configuring and monitoring control sites. Both can be accessed from your project's Workbench. They are described as follows:

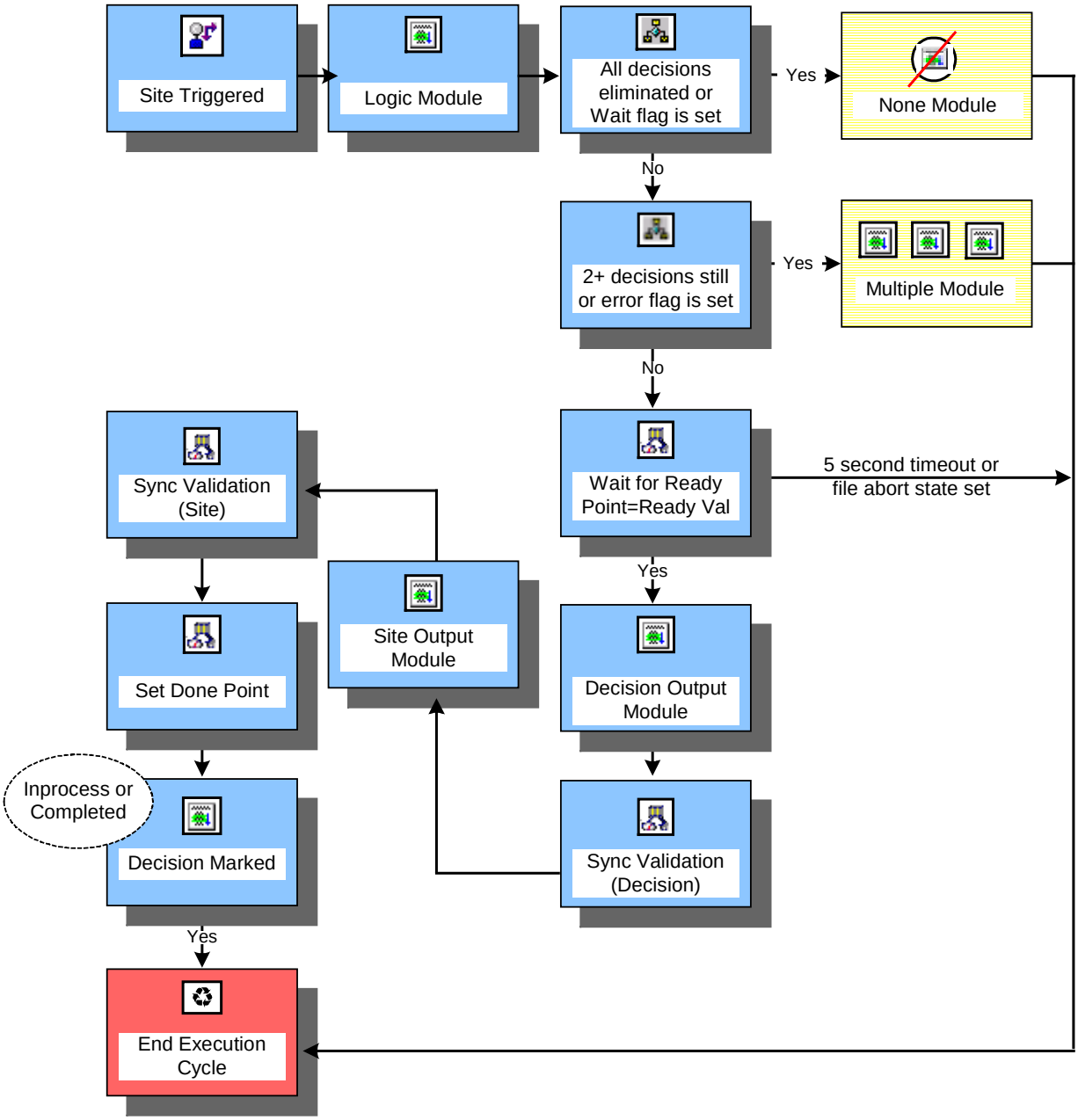
Icon	Subsystem	Objective
	Tracker Configuration User Interface	Graphical user interface for configuring RCOs and all associated components.
	RCO Runtime User Interface	Graphical user interface for monitoring runtime data on control sites.

The Tracker Configuration User Interface (TrackerConfig_UI) provides you with an integrated structure for configuring all of the components needed at the control site level for automated production flow.

Using the Execution Sequence to Your Advantage

Here is another look at the execution sequence at a control site. It is a good idea to keep this is mind when configuring RCO. In order to take advantage of its powerful monitoring abilities, there are several components that must be configured from triggers to decisions to output modules, and so on.

RCO Execution Sequence



Open the Tracker Configuration User Interface

Use the Tracker Configuration User Inteface to configure a routing control object. The Tracker Configuration Interface is launched from the CIMPLICITY Workbench.

To open the Tracker configuration user interface:

1. Click **Start** on the Windows task bar.
2. Select Programs>CIMPLICITY>HMI>

to open the Workbench.
3. Click on the Workbench toolbar.

   The Open dialog box opens.
4. Navigate to your project.
5. Double-click the project.
6. Click **OK**.

   The project opens in the Workbench.

6. Double-click the **Tracker Configuration** icon in the Workbench directory.

Result: The Options dialog box will display when launching the user interface for the first time; otherwise, the Tracker Configuration User Interface will display. *Go to next page for instructions on entering data source information.*

Tip: Open your project quickly by clicking on it in the recently used list that displays near the bottom of the File menu. The last four projects accessed will display in the list.

Data Source Information

Associated configuration data is stored in a SQL Server database. Specify the data source to be used with the RCO database as instructed below.

To enter data source information:

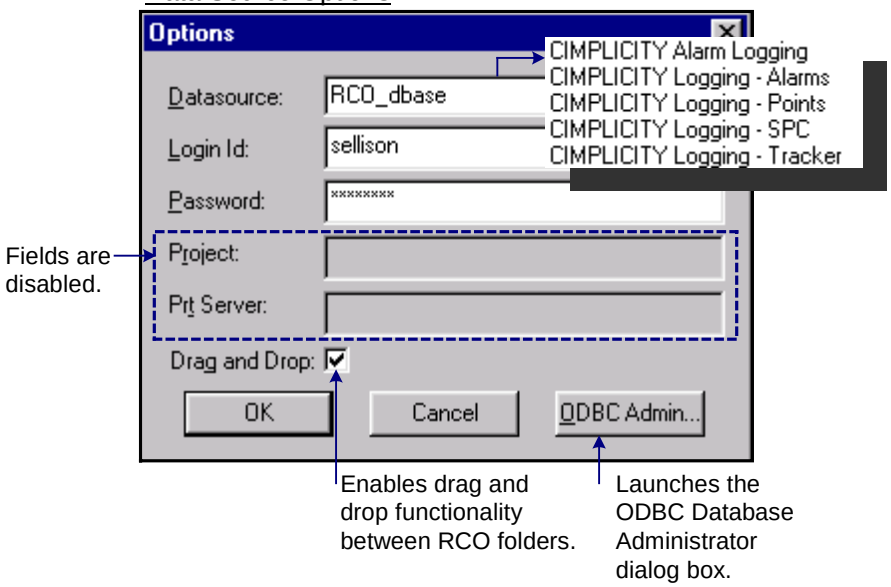
1. Click Tools on the Tracker window menu bar.
2. Select Options.

   The Options dialog box opens.
3. Select the data source from the drop-down list in the Datasource field.

   This must be defined as a system data source.
4. Enter the ID that allows access to the SQL Server data source in the Login ID field.
5. Enter the corresponding password for the Login ID in the Password field.
6. Check the Drag and Drop box to allow sites, triggers and decisions to be dragged and dropped between folders.
7. Click **OK**.

Result: The data source is designated. All required tables are created in the database as specified by the designated data source.

Data Source Options



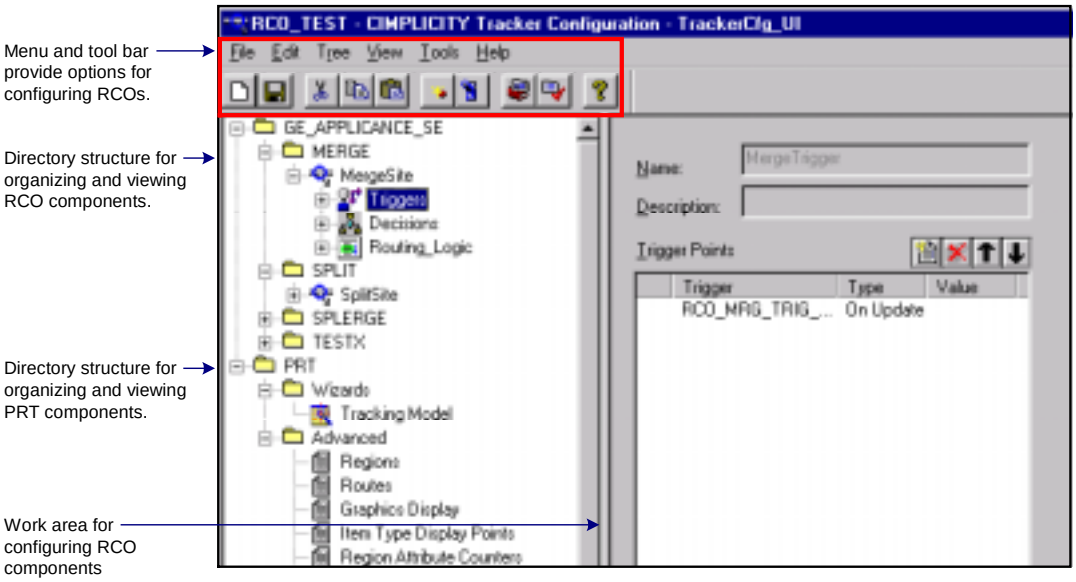
Note: Click **ODBC Admin** to run the standard ODBC 32-bit administrator tool for ODBC configuration. Any change to the designated data source must be changed through the Tracker Configuration User Interface.

Tracker Configuration User Interface Overview

The Tracker Configuration User Interface opens after the data source has been initially designated, and when subsequently launching the interface from the Workbench. All of the tools necessary to configure control sites and associated components are provided in the window.

The menu bar provides you with several options for configuring and viewing RCO information. Also, the toolbar buttons allow you to perform some of the most common functions with one click. The integrated structure holds the RCO directory of files in the left pane, and the related configuration dialogs in the right pane.

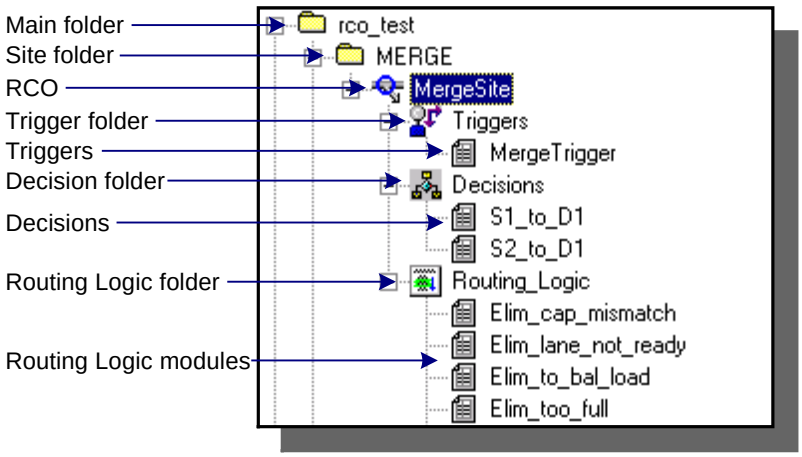
Tracker Configuration User Interface



RCO Directory Structure

The RCO directory is organized in a hierarchy so that information for a control site can be easily accessed, viewed, and modified.

CIMPLICITY Routing Control Object Configuration window



Each level of data in the RCO hierarchy has a function as follows:

Icon	Type	Objective
	RCO Site	Contains all of the instructions for making production routing decisions at the control site.
	Locked RCO Site	RCO site icon changes when it is locked. Locking the site enables modification of its properties.
	Trigger folder	Folder that holds all of the configured triggers for the control site.
	Trigger	One or more points that will activate the control site when its defined conditions are met.
	Decisions folder	Folder that holds all of the configured decisions for the control site.
	Decision	Instructions for executing an output module, which in turn, sets a series of points. Actual production routing is performed at this juncture.
	Routing_Logic folder	Folder that holds all of the configured routing logic modules for the control site.
	Routing logic modules	Modules that consist of function blocks to achieve a particular routing result in line with factory conditions.

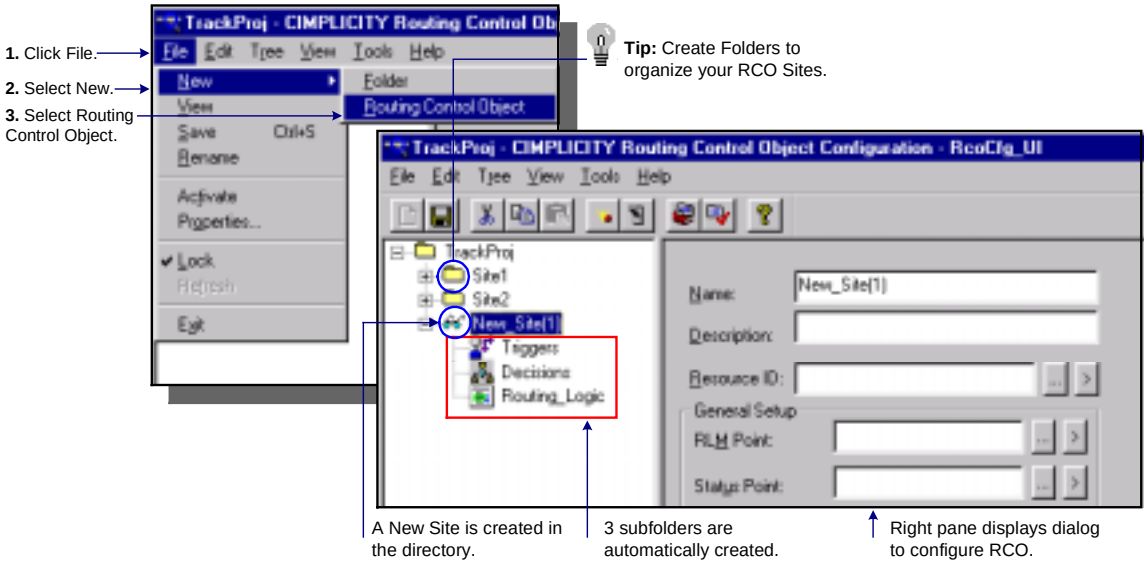
How to Create Routing Control Objects

You can create and configure new routing control objects in the Tracker Configuration User Interface. Begin by placing a blank RCO in the directory.

To create a new routing control object:

1. Select the main project folder in the left pane of the window.
2. Click File on the menu bar.
3. Select New>Routing Control Object.

Result: A New_Site will display in the directory and the right pane will display a dialog for configuring the control site. Click on the + to expand the directory to view three folders automatically created by the configuration user interface: Triggers, Decisions and Routing Logic.


1. Click File.
2. Select New.
3. Select Routing Control Object.
Tip: Create Folders to organize your RCO Sites.
TrackProj - CIMPLICITY Routing Control Object Configuration - RcoCfg_UI
A New Site is created in the directory.
3 subfolders are automatically created.
Right pane displays dialog to configure RCO.

Tip: Organize information in the directory by creating folders. From the File menu, select New>Folder and a folder icon will display in your directory. You can then drag and drop sites into and between folders.

RCO Configuration Tasks

In order to configure an RCO you must first configure the site, and then all of its related components. Detailed instructions, guidelines and examples are provided for each of the associated steps and tasks.

Steps to configure an RCO include:

Step 1. Configure a Routing Control Site

Step 2. Configure Triggers

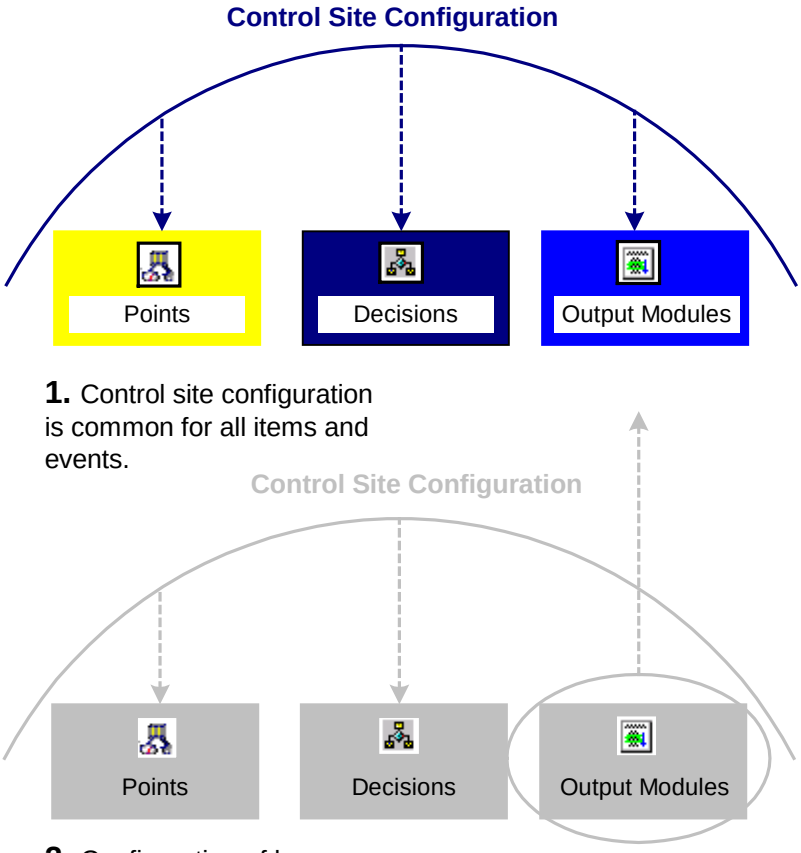
Step 3. Configure Decisions

Step 4. Configure Routing Logic

Step 1. Configure a Routing Control Site

Once you have created a new site in the Tracker Configuration User Interface, configure the control site using the integrated dialogs in the right pane of the window. Configuration at the RCO site level consists of points and logic modules that are common for all items and events.

Important: Configuration of lower-level data items, for example triggers or decisions, will override site level configuration.



To configure a control site, perform the following tasks:

A. Lock site
B. Name and describe RCO
C. Configure the General Setup group
D. Configure the Output Modules group
E. Configure the Execution Sequence group
F. Configure the Automatic Triggers group

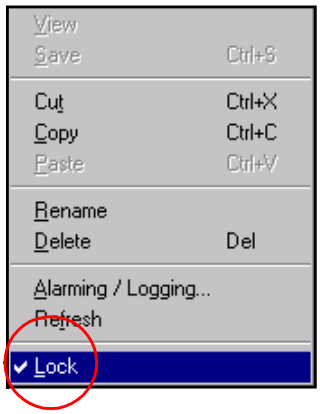
Task A. Lock site

In order to configure an RCO, the site must be locked. When the site is locked, all of the fields in the associated dialog are eligible for modification.

To lock an RCO site:

1. Select the site in the RCO directory and right-click.
2. Select Lock from the popup menu.

Result: Using either method, the Lock option on the popup menu is checked indicating it is the active option. All of the fields in the dialog (left pane) are active.



Task B. Name and describe RCO

In the top group of the RCO dialog, provide a unique name and description for the RCO. The resource is also designated here.

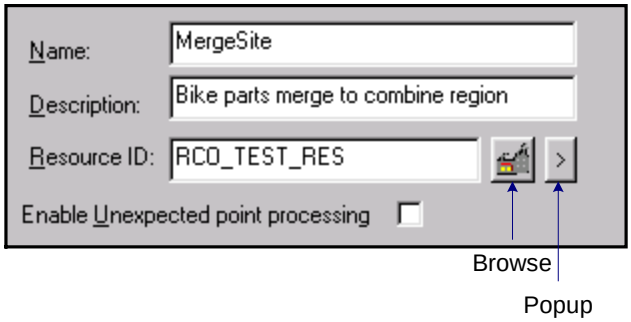
To name and describe RCO:

1. Enter a unique name for the RCO in the Name field.
2. Enter a brief description for the purpose of the RCO in the Description field.
3. Enter a Resource ID.

   Click either:

   - to browse for an existing resource in the project, or
   - to designate a new resource.

RCO dialog - top group



4. Check the Enable Unexpected point processing box to allow RCO to generate an alarm when a point change comes into a site that is unexpected.

   Guidelines

   Unexpected point processing applies to three RCO point types: Trigger, Validation and Verification. The Enabled Unexpected point processing option allows the RCO system to disable the control site when a point change occurs on one of these point types that is "not expected." An error will also display in the RCO_UI, and an alarm will be generated. Configure alarm state using the Alarming/Logging dialog box—see page 44 for details.

Example

Example of Unexpected point processing

Point Received by RCO	Unexpected Point	Comments
TRIG_POINT_1	No	Trigger Sequence A expecting point.
TRIG_POINT_3	No	Trigger Sequence B expecting point.
TRIG_POINT_2	Yes	▪ Site disabled ▪ Error generated in RCO_UI ▪ Alarm generated

- Trigger,
- Validation and
- Verification.

Task C. Configure the General Setup group

To configure the General Setup group:

1. In the RLM Point field, browse for or create a new point that will be updated during RCO runtime with the name of the RLM to be executed for the site.

   Guidelines

   The RLM point is a virtual point with a string data type. It is either updated at Runtime with the name of the routing logic module to be executed, or a user can set the point with the name of the RLM. Ensure that Enable Point is checked on the General page of the Point Properties dialog box.

2. In the Status Point field, browse for or create a point that is updated to indicate the status of the control site.

   Status point values are:

   0 Enabled control site.

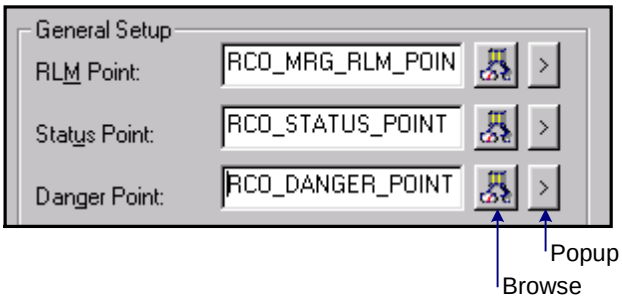
   1 Disable control site.

   3 Suspended control site.

   Guidelines

   The Status point is a virtual point with an integer data type. It is either updated at Runtime with the value of the control site status, or a user can set the point to manage the status of the control site. Ensure that Enable Point is checked on the General page of the Point Properties dialog box.

   RCO Configuration dialog - General Setup group



3. In the Danger Point field, browse for or create a point that will determine if any decisions without a 'local danger point' are to be rolled back.

   Boolean values are:

   0 No danger and decision is to be eliminated.

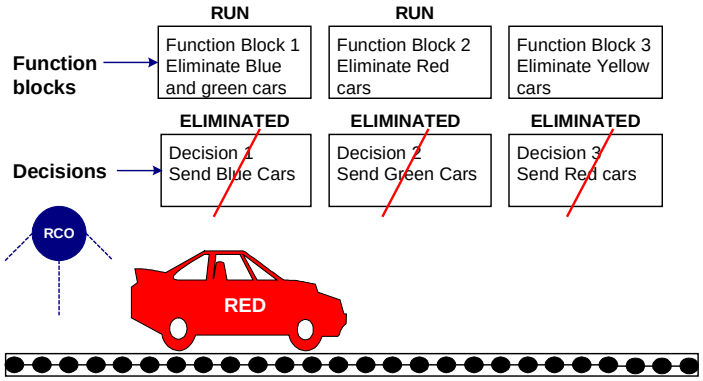
   1 In danger and decision is to be rolled back.

   Guidelines

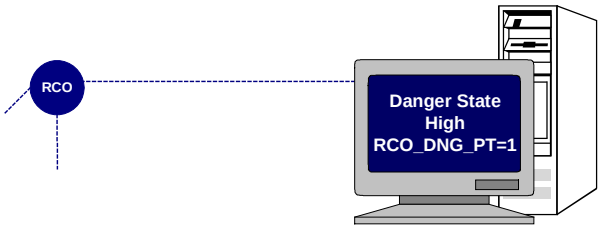
   The Danger point can be a device or a virtual point with a Boolean data type. It is updated at runtime with the danger status of the control site. If a control site has eliminated all decisions and has an always evaluate flag of 'Breakable with Danger Point High', then the RCO system automatically checks the danger point. When the Danger point = 1, then the RCO is in a danger state and the system will automatically roll the list back to the previous logic block—see figure for details. Ensure that Enable Point is checked on the General page of the Point Properties dialog box.

Example

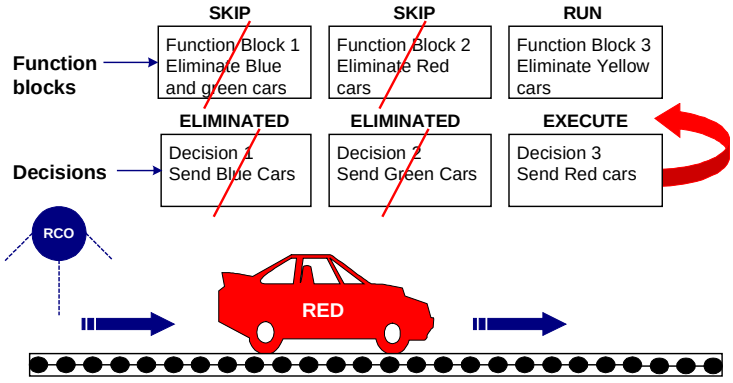
1. Two of three function blocks are run eliminating all decisions.



2. Function block 2 has an always evaluate flag of 'Breakable' with Danger Point High.



3. RCO rolls back to previous decision and applies function block 3.



Red car is sent down the line to the next region.

Task D. Configure the Output Modules group

You can configure Output Modules at the site level to execute one or more function blocks, or to execute a custom BCE script based on what happens when the routing logic module is run. The Output Modules group consists of four fields, which are explained below with detailed configuration options in the following sections.

For additional information about configuring output modules, refer to these sections:

- Create a New Output Module
- Use Predefined Output Module
- Popup Menu Functions
- Basic Control Engine (BCE) Scripts

To configure the Output Modules group:

1. In the Single field, browse for or create an output module that will be executed when a single (one) decision survives the routing logic, i.e. control site works properly.

   Guidelines

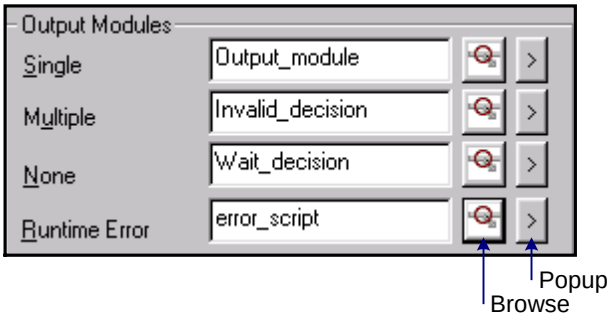
   The Single Output module is run when one decision is left after the routing logic module is run, and after the decision output logic is executed. This module is most commonly used to run output logic that is common for all successfully executed decision.

2. In the Multiple field, browse for or create an output module that will be executed when multiple (two or more) decisions survive the routing logic.

   Guidelines

   The Multiple Output module is run when two or more decisions are left after the routing logic module is run. This module is used to fix the problem of having multiple decisions left and can be used to generate an alarm for user intervention. Using the RCO Execution Sequence as a guide, note that the control site cycle ends after the Multiple Output module is run.

   RCO Configuration dialog - Output Modules group



3. In the None field, browse for or create an output module that will be executed when there are no (zero) decisions that survive the routing logic.

Guidelines

The None Output module is run when there are no decisions left after the routing logic module is run. This module can be used to generate an alarm for user intervention., or to set a done point that will in turn prepare the site to re-trigger the control site. Using the RCO Execution Sequence as a guide, note that the control site cycle ends after the None Output module is run.

4. In the Runtime Error field, browse for or create an output module that will be executed when routing logic fails during the decision-making cycle.

Guidelines

The Runtime Error output module is run when the routing logic fails during execution. This module can be used to generate an alarm to initiate user intervention, or to set a done point that will in turn prepare the site to re-trigger the control site.

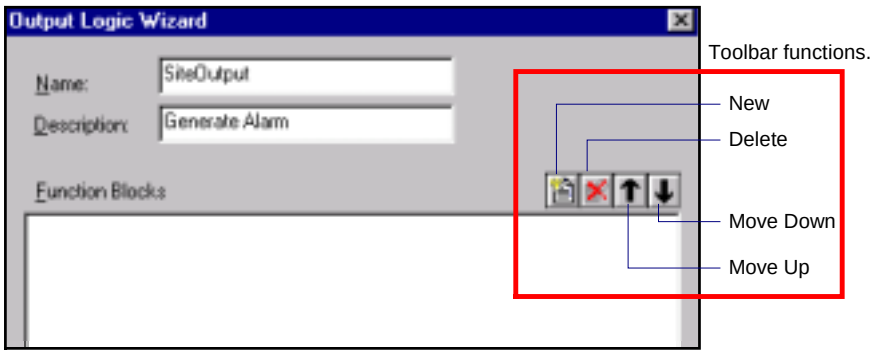
Create a New Output Module

In the Output Modules group you have the option of creating a new output module, using an existing output module, or editing an existing output module. An output module can consist of one or more function blocks that work together to perform

To create a new output module:

1. Click > adjacent to the field where you want to create a new output module.
2. Select New from the popup menu.

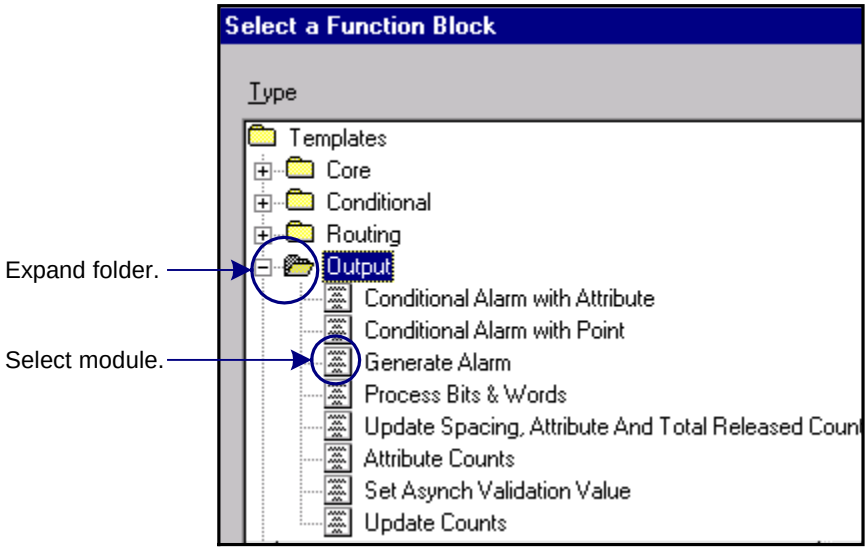
   The Output Logic Wizard opens.



3. Enter a unique Name to identify the output module.
4. Enter a brief Description for the module.
5. Click **New**.

   The Select a Function Block dialog box opens.

Module selection example



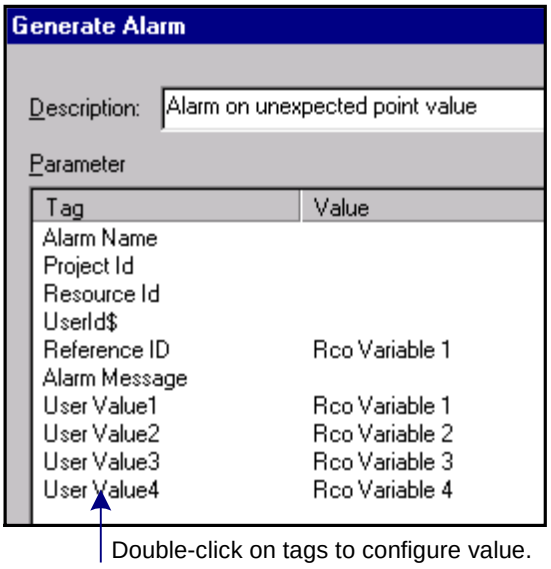
6. Expand the Function Block Class folder to display the corresponding function blocks. Descriptions are as follows:

Class	Description
Core	Generic, all-purpose blocks.
Conditional	Evaluates If-Then-Else conditions.
Routing	Performs routing functions.
Output	Produces an output in the system, such as generating an alarm.
Diagnostics	Performs diagnostic functions.
PRT	Performs PRT functions.
Include	Enables the inclusions of basic scripts.

7. Double-click the function block that is to be added to the output module.

   The dialog box for the function block opens.

Example of a function block dialog box



8. Enter a brief Description for the module.
9. Set parameters by double clicking on each of the Tags in the list box.

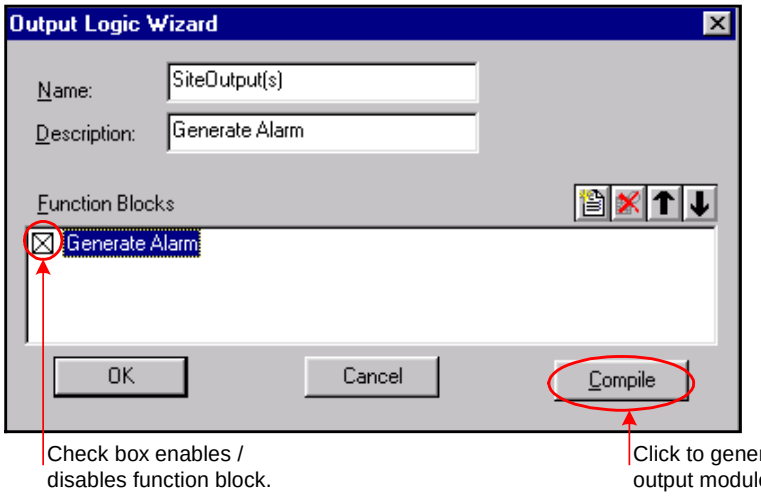
   Note: The dialog box that opens is dependent upon the tag.

10. Set the value for the parameter using the provided input option, e.g. drop-down list or popup menu.

    Note: The input options in the Parameter dialog box vary by parameter. There can be drop-down lists, popup menus, browse buttons or edit controls that can be used to set the value of the parameter. In the example above, there is a drop-down list.

13. Click **OK** to return to the Select a Function Block dialog box.
14. Repeat procedure from step 7 to add other function blocks to the list; otherwise, proceed to step 15.
15. Click **OK** to return to the Output Logic Wizard.
16. Click **Compile** to compile the output module and to display any syntactic errors that may exist.

17. Click **OK** to save the configuration of the output module and close the Wizard.



Tip: Use the toolbar in the Wizard to add or delete function blocks, and to change the position of the function block up or down in the list. Also, you can use the checkbox next to each function block to enable or disable it in the list. Be sure to compile when you have made changes to the function block list.

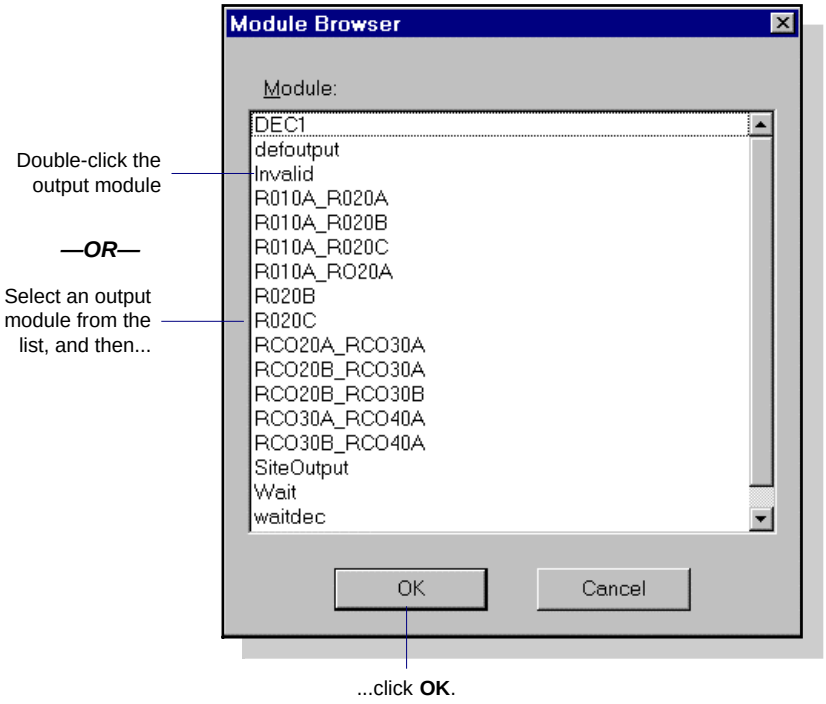
Use Predefined Output Module

To use a predefined output module:

Once you have created one or more output modules, you can select one from the list and use it as is, or you can edit it to comply with your requirements.

1. Click adjacent to the field where you want to add a predefined output module.

   The Module Browser window will display.

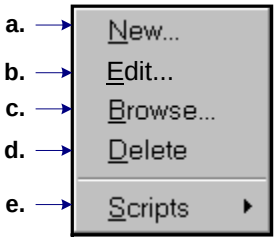


2. Do one of the following:
   - Double-click an output module in the list or
   - Select an output module from the available list and click **OK**.

Popup Menu Functions

You can use the popup menu to perform additional operations.

Click next to the output module field to display the popup menu.



a. Launches the Output Module Wizard to enable creation of a new output module.
b. Allows editing of the function block in a selected output module.
c. Launches the Module Browser for selecting a predefined output module.
d. Deletes selected item.
e. Enables creation of BCE scripts.

Basic Control Engine (BCE) Scripts

When configuring output modules, you have the option of creating custom BCE scripts for execution, rather than choosing a predefined function block.

See the CIMPLICITY Basic Control Engine Operation Manual (GFK-1180) for more information about configuring BCE scripts

Task E. Configure the Execution Sequence group

You can configure the Output Modules at the site level to execute a set of Function Blocks or to execute custom BCE scripts that you created. Each field is described below, with additional explanations and instructions follow.

Field	Description
Ready Point	Name of an analog CIMPLICITY Point that will be updated to indicate that the automation equipment is ready for a decision to be executed. The RCO runtime system will wait until the Ready Point is updated to the value specified in the Ready Value field before output script for a selected decision is executed.
Ready Value	Value written to Ready Point to indicate that the automation equipment is ready for a decision to be executed.
Done Point	Name of an analog CIMPLICITY Point to be updated when a decision has been executed. When the RCO runtime system has completed the execution of the output script associated with the selected decision, it updates the Done Point to the value specified in the Done Value field.
Done Value	Value written to the Done Point by the RCO when the decision output script has been executed. The value entered must be numeric.
Verification Point	Name of a CIMPLICITY Point that will be updated to indicate that a decision has been successfully completed. An RCO waits for this point to be set to the value specified in the Verif. Value.
Verif. Value	Value to be written to Verification Point by the automation equipment or other process to indicate that the decision execution has been successfully completed.
Verif. Timeout	Value of a timeout in seconds after which site about state is set. A value of Ø makes the site wait indefinitely for the verification point to get set to verification value.

To complete fields in the Execution Sequence Group:

1. Do one of the following:

   Method 1

   A. Click ... next to the Ready Point field to browse existing Points in the project.

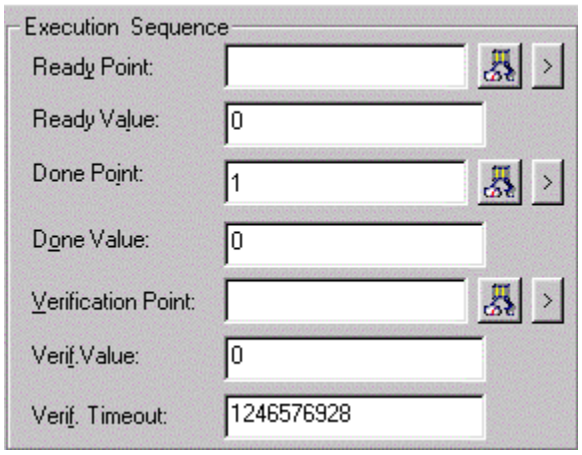
   B. Select the Point from the available list.

   C. Click **OK**.

Method 2

A. Click to designate a new Point.
B. Select New from the popup menu.
C. In the New Point dialog box, enter the Point ID.
D. Click the radio button for the Type: Device or Virtual.
E. Click the radio button for the Class: Analog, Boolean or Text
F. Click **OK**.

2. In the Ready Value field, enter the value associated with the assigned Ready Point.
3. Repeat steps 1 through 3 to designate Points and values in the following fields:
   - Done Point
   - Done Value
   - Verification Point
4. Enter the verification value in the Verif. Value field.
5. Enter the timeout value in the Verif. Timeout field.



Important: If an updated Done point value is the same as the previous value, RCO will not know that the value is updated. Therefore, a decision may timeout waiting for a Done point even though the point is set to the correct value.

To insure that RCO recognizes an updated Done Point:

1. Configure a site with a Done point.

   When the Done value updates to a new value the site is done.
2. Change the point to a value other than the Done point value either through a script or manually.

Result: RCO notifies you the next time it sets the point to the Done value.

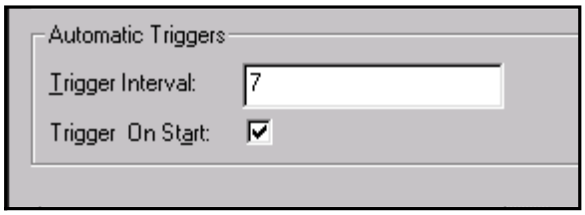
Task F. Configure the Automatic Triggers group

The Automatic Triggers group enables you to configure when your site will be triggered. Explanation of fields and instructions follow.

Field	Description
Trigger Interval	Enter the number of seconds for the automatic trigger; which, if not triggered within this time period, will trigger automatically. The default resolution of the timer is 5 seconds, so if you specify the trigger interval to be 6 seconds, it will actually trigger between 6 and 10 seconds.
Trigger On Start	Check this box if the site is to be triggered immediately after starting.

To set an automatic trigger:

1. Enter the number of seconds to automatically trigger the site in the Trigger Interval field
2. Check the Trigger On Start box to trigger the site immediately after starting.



Note: You may use both of the options in the Automatic Triggers group.

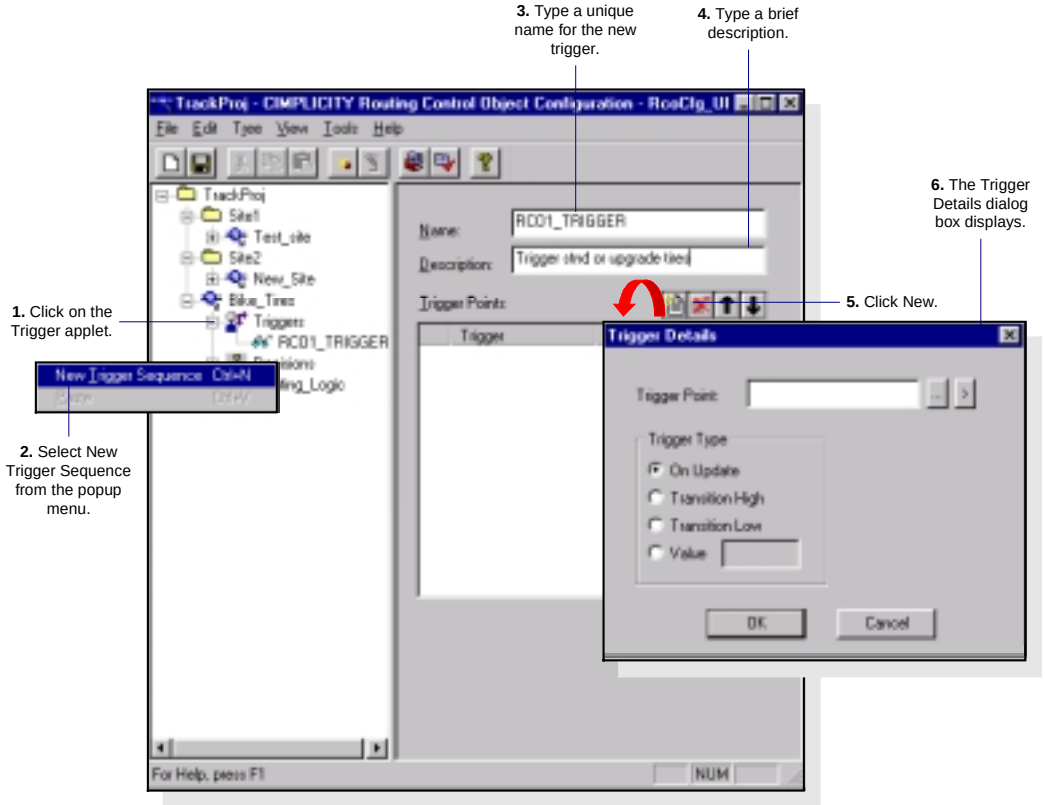
Step 2. Configuring Triggers

Add triggers to your Routing Control Object using the Tracker Configuration User Interface.

To configure triggers:

1. Right-click the **Triggers** icon in the RCO branch of the directory.
2. Select New Trigger Sequence from the popup menu.

   A New Trigger icon will display in the directory, and the left pane will update with the dialog for configuring a trigger.
3. In the Name field, enter a unique name for the new trigger.
4. In the Description field, enter a brief description for the trigger.
5. Click to display the Trigger Details dialog box.



6. Enter the name of the Point In the Trigger Point field or do one of the following:

   Method 1

   A Click next to the Ready Point field to browse existing Points in the project.

   B. Select the Point from the available list.

   C. Click **OK**.

Method 2

A. Click to designate a new Point.

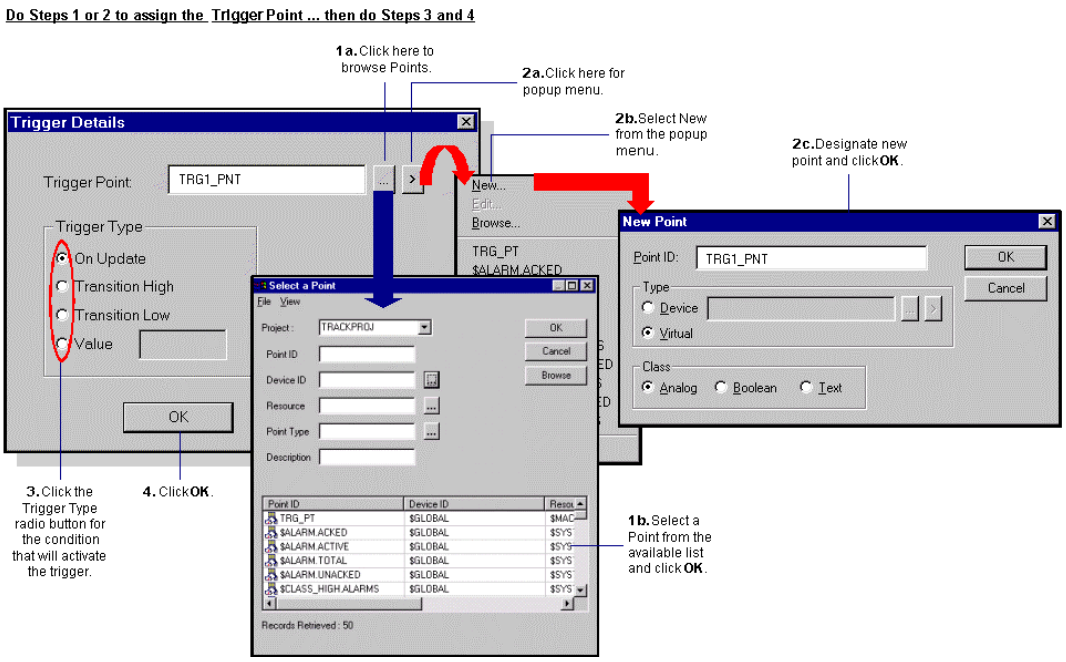
B. Select New from the popup menu.

C. In the New Point dialog box, enter the Point ID.

D. Click the radio button for the Type: Device or Virtual.

E. Click the radio button for the Class: Analog, Boolean or Text

F. Click **OK**.

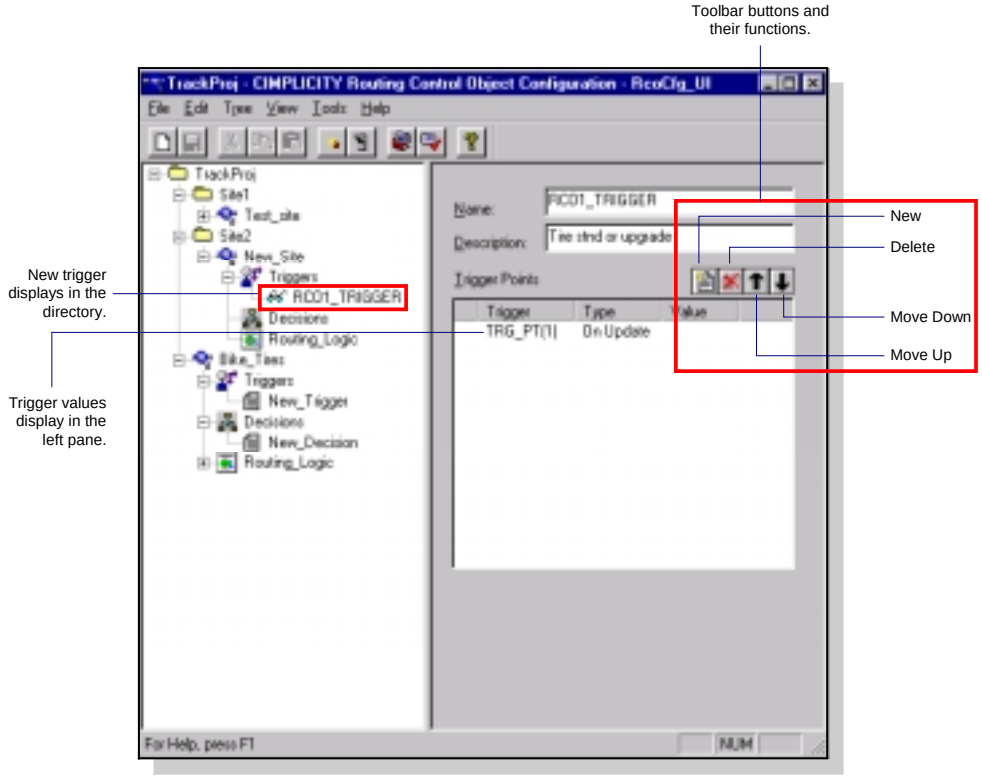


7. Click the appropriate Trigger Type radio button to indicate when the trigger will be activated as follows.

On Update	Value of the Point must change to activate the trigger.
Transition High	Value of the Point must change from 0 to a non-zero value to activate the trigger. The initial state of this trigger upon CIMPLICITY HMI startup is high, so the point must change to 0 and then to a non-zero value.
Transition Low	Value of the Point must change from a non-zero value to 0 to activate the trigger. The initial state of this trigger upon CIMPLICITY HMI start is low, so the point must change to a non-zero value, and then to a 0 value.
Value	Point changes to the value you specify to activate the trigger. When radio button is clicked, the Value field will activate. Type the value in the field.

8. Click **OK**.

Result: The New Trigger will display in the directory in the right pane, and the trigger values display in the left pane of the window.



Note: More than one trigger can be added to the Routing Control Object. Repeat procedure to add more triggers.

Step 3. Configuring Decisions

Configure decisions using the Tracker Configuration User Interface. Explanation of fields and instructions follow.

Example

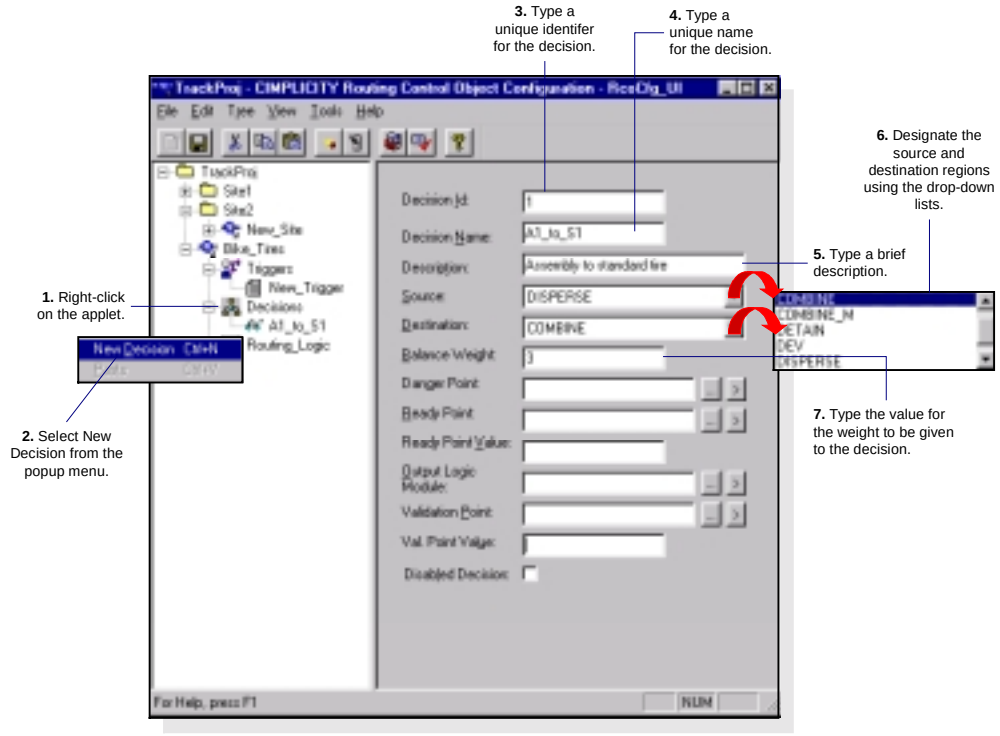
Description	
Decision ID	Numeric ID—must be unique.
Decision Name	Unique name.
Description	Brief textual description.
Source	Region that the item will moved *from*.
Destination	Region the item will moved *to.*
Balance Weight	Numeric weight associated with the decision. At runtime, this weight will be used when evaluating / selecting an appropriate decision for execution.
Danger Point	The RLM will look for the site danger point when this field is blank. If both points are undefined, the decision will be eliminated. For decisions with an Always Evaluate flag of Breakable, this point determines if any decisions without local danger point is rolled back. A value of "1" means "In Danger" and the decision should be rolled back.
Ready Point	CIMPLICITY analog Point that will be updated indicating that the automation equipment is ready for a decision to be executed. The RCO runtime system will wait until the Ready Point is updated to the value specified in the Ready Value field before the output module for a selected decision is executed.
Ready Point Value	Value written to Ready Point indicating that the automation equipment is ready for a decision to be executed.
Output Logic Module	Specify the name of an output logic module to be executed when this decision is selected.
Validation Point	CIMPLICITY Point that will be updated indicating that the decision has been asynchronously validated.
Validation Value	Value to be written to Validation point by automation equipment or other process to mark the already executed decision status as ‘completed’. If the Validation point is defined, then at the end of execution sequence of site, the decision is marked ‘in process’.
Disabled Decision	Disables decision.

Configuring Decisions

To configure decisions:

1. Right-click the Decisions icon in the RCO branch of the directory.
2. Select New Decision from the popup menu.

   A New Decision icon will display in the directory, and the left pane will update with the dialog for configuring a decision.
3. In the Decision Id field, enter a unique identifier for the decision.
4. In the Decision Name field, enter a unique name for the decision.
5. In the Description field, enter a brief description of the decision.
6. Use the Source drop-down list to designate a region *from* which the items will be moved.
7. Use the Destination drop-down list to designate a region *to* which the items will be moved.
8. In the Balance Weight field, enter a numeric value for the weight to be given to the decision.



9. (*Optional*) In the Danger Point field, enter the name of the Point, or do one of the following:

   Method 1

   A. Click next to the field to browse existing Points in the project.

   B. Select the Point from the available list.

   C. Click **OK**.

   Method 2

A. Click to designate a new Point.

B. Select New from the popup menu.

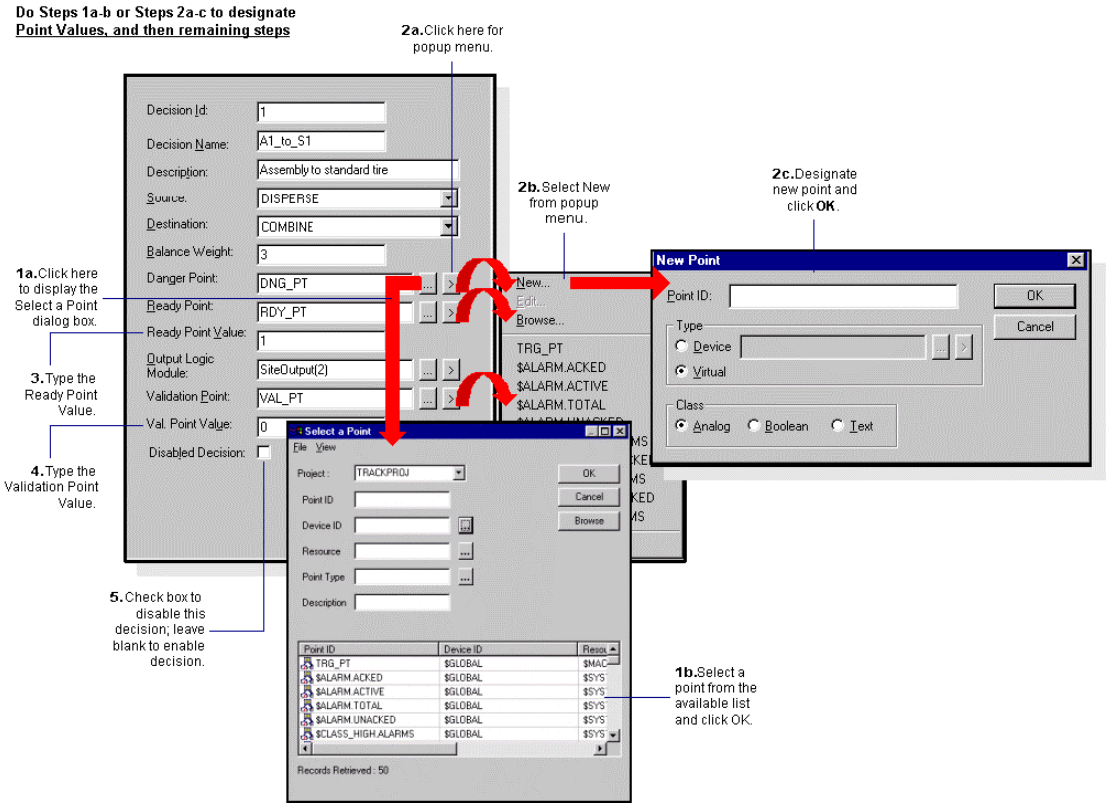
C. In the New Point dialog box, enter the Point ID.

D. Click the radio button for the Type: Device or Virtual.

E. Click the radio button for the Class: Analog, Boolean or Text

F. Click **OK**.

10. Repeat Step 9 to designate the Ready Point.
11. Indicate the value for the ready Point in the Ready Point Value field.



12. Designate an Output Logic Module as follows:

Method 1

A. Click to display the Module Browser dialog box.

B. Select a module from the list.

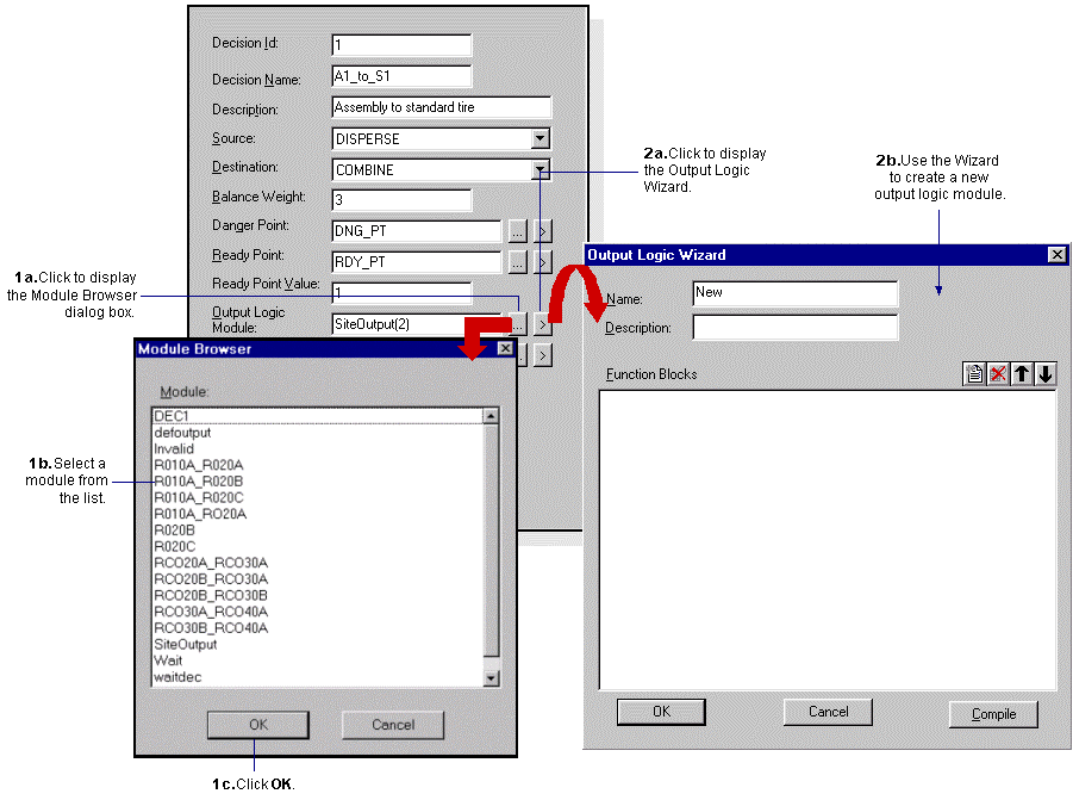
C. Click **OK**.

Method 2

A. Click to display the Output Logic Wizard.

B. Go to topic, "Configure the Output Modules Group" in this chapter for complete details about configuring an output logic module.

Do one or the other to designate an Output Logic Module



13. Repeat Step 9 to designate the Validation Point.
14. Enter the validation point value in the Val. Point Value field.
15. Check the Disabled Decision box to disable this decision, or leave blank to enable the decision.

Note: Each decision has an order that is automatically maintained by RCO. The order is determined by the position of the decision in the directory. The first decision has an order of 1, the Nth decision has an order of N.

Step 4. Configuring Routing Logic

Configure Routing Logic using the provided dialog box. Explanation of fields and instructions follow.

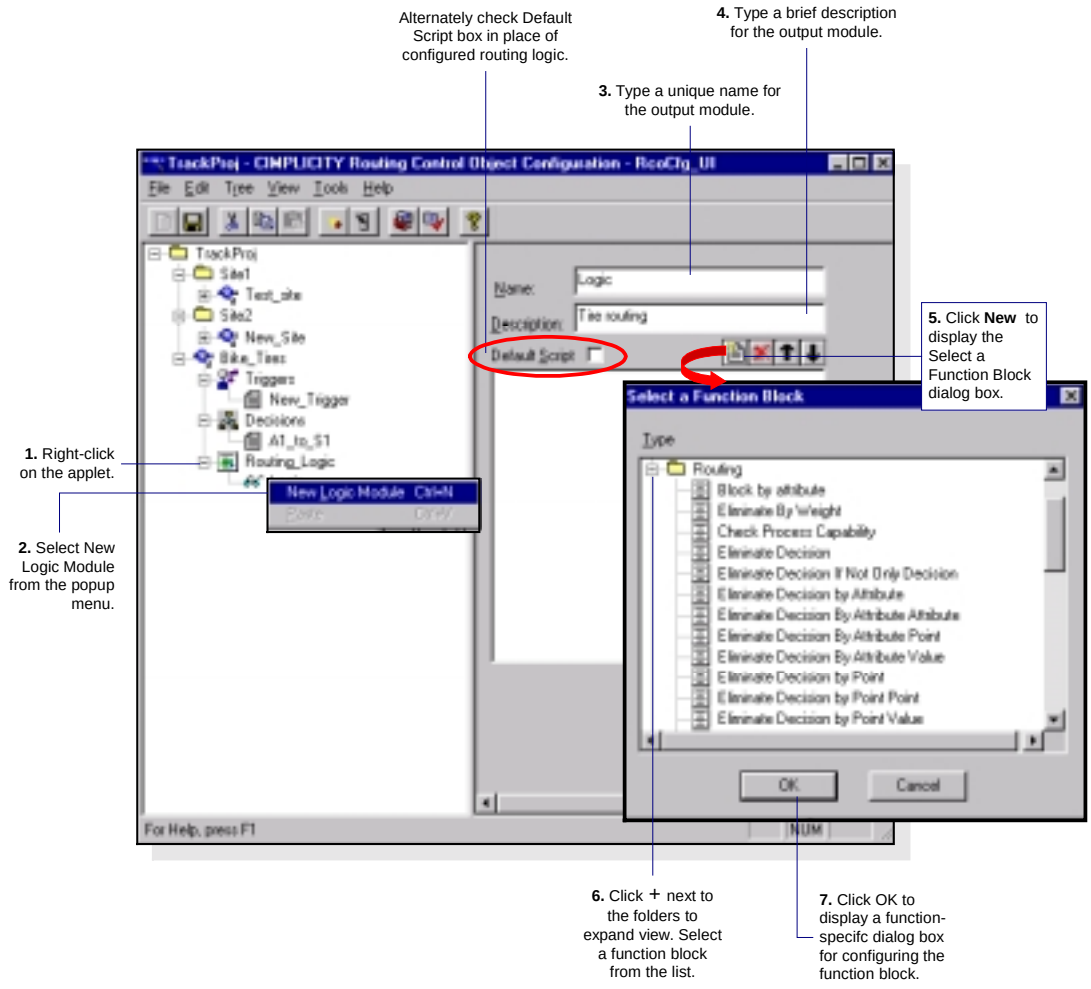
Field	Description
Name	Enter a unique name for this routing logic module.
Description	Enter a unique description for this routing logic module.
Default Script	Each site has one default script. The default script is run if there is no RLM point configured. The default script name is also written to the RLM point on startup if the point is blank.

Configuring Routing Logic

To configure routing logic:

1. Right-click the Routing_Logic icon in the RCO branch of the directory.
2. Select New Logic Module from the popup menu.

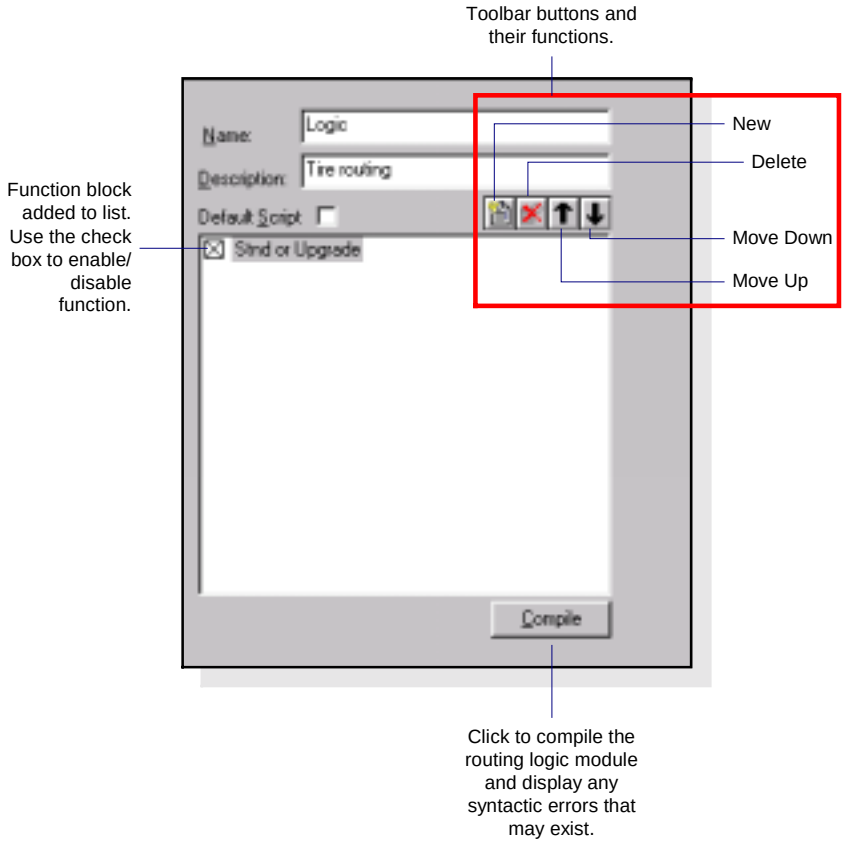
   A Logic icon will display in the directory, and the left pane will update with the dialog for configuring routing logic—see figure.
3. In the Name field, enter a unique name for the routing logic.
4. In the Description field, enter a brief description.
5. Click to display the Select a Function Block dialog box.
6. Click + next to the folders to expand the view.


Alternately check Default Script box in place of configured routing logic.
4. Type a brief description for the output module.
3. Type a unique name for the output module.
5. Click New to display the Select a Function Block dialog box.
1. Right-click on the applet.
2. Select New Logic Module from the popup menu.
6. Click + next to the folders to expand view. Select a function block from the list.
7. Click OK to display a function-specifc dialog box for configuring the function block.
TrackProj - CIMPLICITY Routing Control Object Configuration - RcoCfg_UI
File Edit Tree View Tools Help
Name:
Logic
Description:
Tee routing
Default Script
New Logic Module Ctrl+N
Select a Function Block
Type
Routing
Block by attribute
Eliminate By Weight
Check Process Capability
Eliminate Decision
Eliminate Decision If Not Only Decision
Eliminate Decision by Attribute
Eliminate Decision By Attribute Attribute
Eliminate Decision By Attribute Point
Eliminate Decision By Attribute Value
Eliminate Decision by Point
Eliminate Decision by Point Point
Eliminate Decision by Point Value
OK
Cancel
For Help, press F1

7. Select a function block.
8. Click **OK** to display a function-specific dialog box.
9. figure the function block and associated parameters.
10. Click **OK** to add the function block to the routing logic list in the main dialog box.

11. Click **Compile**.

Result: The routing logic is added to the RCO*—see figure below.*



Note: More than one module can be added to the Routing Control Object. Repeat procedure to add more routing logic modules.

Note: Depending on the function block you selected, different types of dialog boxes display requiring unique configuration and parameter values. Similarly, the Parameter dialog boxes vary by parameter. There can be drop-down lists, popup menus, browse buttons or edit controls that can be used to set the value of the parameter.

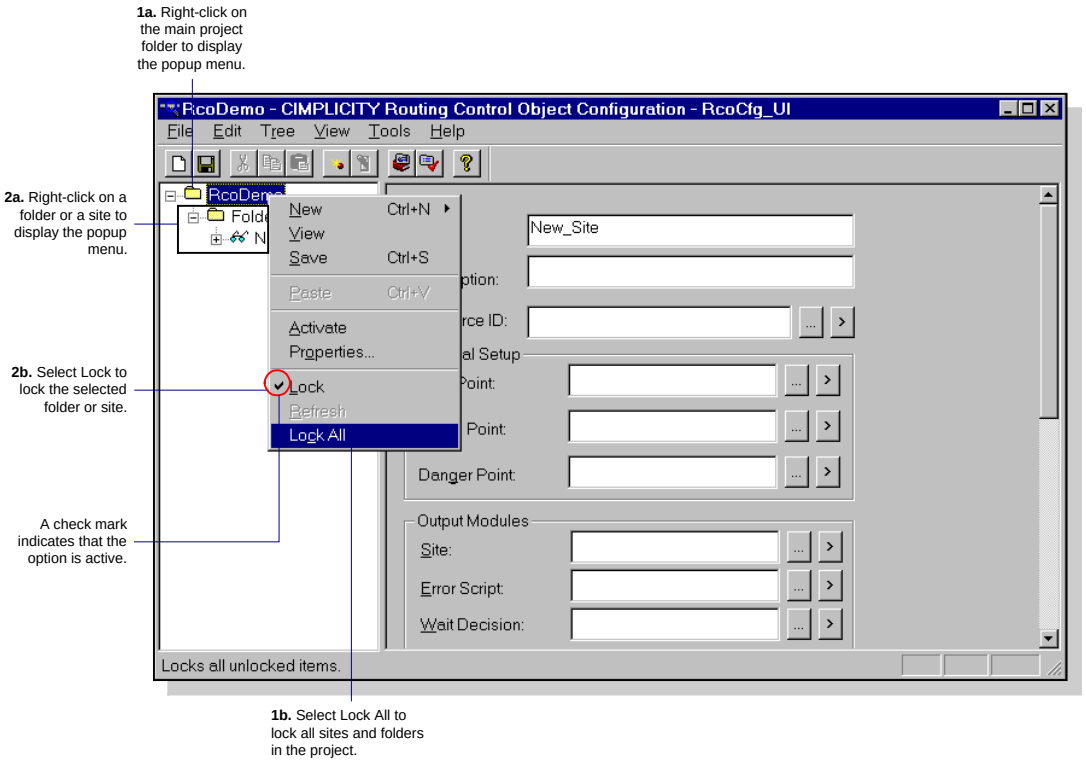
Locking Operation

A site or folder must be locked in order to make modifications to its content. An unlocked site or folder will only allow you to view and copy data. Only one user can lock a site at a time. If you try to lock a site already locked by another user, an error message will display.

To lock a site or folder:

1. Select the site or folder to be locked.
2. Right-click to display the popup menu.
3. Select Lock.

Result: A check mark will appear next to the option indicating that it is active*—see figure.*


1a. Right-click on the main project folder to display the popup menu.
2a. Right-click on a folder or a site to display the popup menu.
2b. Select Lock to lock the selected folder or site.
A check mark indicates that the option is active.
1b. Select Lock All to lock all sites and folders in the project.
RcoDemo - CIMPLICITY Routing Control Object Configuration - RcoCfg_UI
File Edit Tree View Tools Help
New Ctrl+N
View
Save Ctrl+S
Paste Ctrl+V
Activate
Properties...
Lock
Refresh
Lock All
New_Site
Danger Point:
Output Modules
Site:
Error Script:
Wait Decision:
Locks all unlocked items.

Lock All Folders and Sites

To lock all folders and sites:

1. Select the main project folder in the directory.
2. Right-click to display the popup menu.
3. Select Lock All.

Result: A check mark will appear next to the option indicating that it is active*.*

Save RCO Configuration Data

Once you have configured the routing control Site, you must save the data and activate each configured folder. Routing control sites within active folders are supported in the RCO runtime environment, while inactive folders will be ignored.

To save configuration data for a routing control site:

Method 1

1. Click File on the menu bar.
2. Select Save.

Method 2

Click .

Result: Using either method, the directory structure and configuration information will be saved to the database.

Activate Routing Control Sites

Once the data has been configured for the routing control sites, you must activate them as explained below.

To activate routing control sites:

Method 1

1. Click on a folder in the directory.
2. Click File on the menu bar.
3. Select Activate option.

Method 2

1. Right-click on the folder in the directory.
2. Select Activate from the popup menu.

Result: The folder is activated and will be included in the runtime environment.

Additional Functions and Utilities

There are additional functions that you can perform to customize the RCO configuration. For example you can add custom scripts and subroutines to the global library for inclusion in RCO scripts, assign a custom name to predefined Production Tracking (PRT) attributes, or assign additional points to be used in the RCO runtime environment. Also provided are utilities that enable you to verify the RCO configuration data and view a list of errors.

You can take advantage of all of the following features:

- RCO folder properties
- Attribute maintenance
- Regions maintenance
- Verify utility
- Error list utility
- Alarming and logging

RCO Folder Properties

You can customize the properties of the folders in your directory. This includes the main folder that is generated by default in the directory, and subfolders that you create to organize your RCOs.

Two important properties can be set:

- Thread Count—specifies the maximum number of sites that can execute simultaneously. Valid range is 1 to 10.
- Global Library—compatible file that includes BCE scripts and/or subroutines that can be called at runtime from any RCO script. This file may not include a 'sub main'.

To set RCO folder properties:

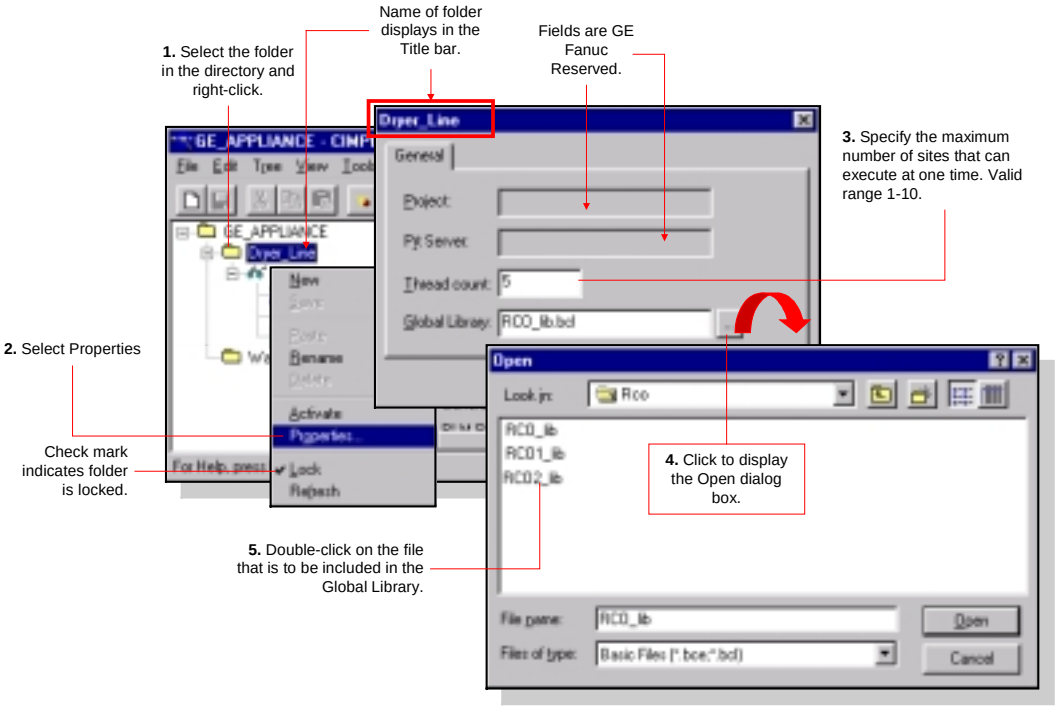
1. Select the folder in the directory.
2. Right-click on the folder and select Lock from the popup menu.

   A check mark next to Lock indicates the folder is locked.
3. Right-click on the folder and select Properties from the popup menu.

   The properties dialog box opens. Notice that the name of the folder appears in the title bar.
4. In the Thread Count field, specify the maximum number of sites, included in this folder, to execute simultaneously. The valid range is 1 to 10 sites at a time.
5. Click next to the Global Library field to display the Open dialog box.
6. Navigate to the file containing the BCE scripts and/or subroutines that you want to add to the RCO Module.

7. Double-click the file.

Result: The file name displays in the Global Library field and is now available to be called at runtime from any RCO script.



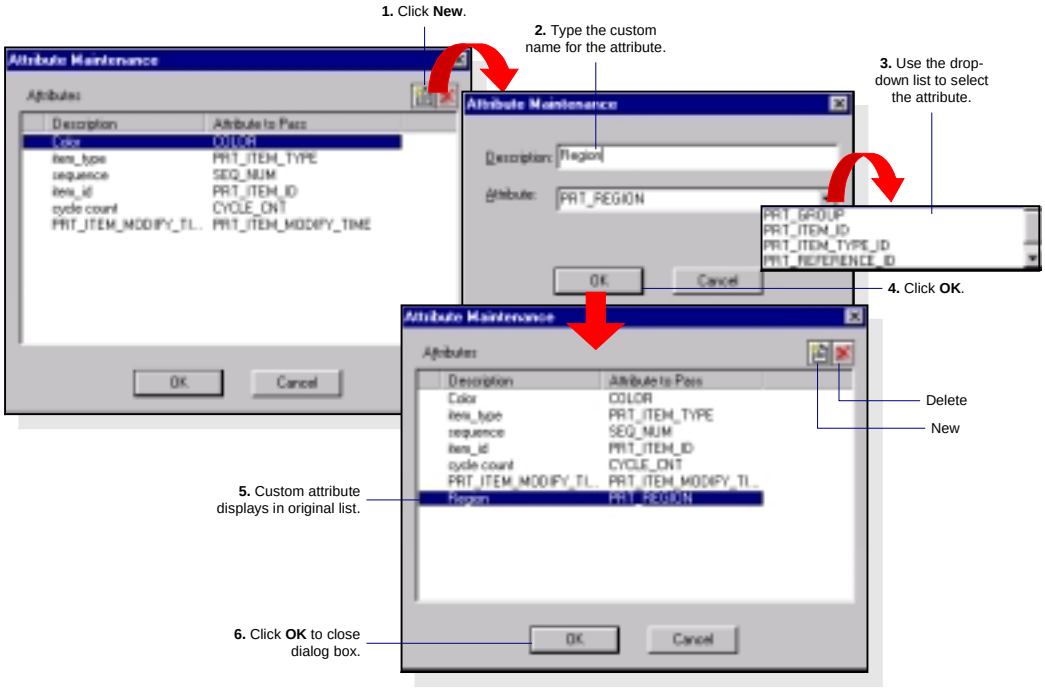
8. Click **OK** to effect changes, or **Cancel** to cancel the operation.

Attribute Maintenance

You can use the Attribute Maintenance dialog box to assign a custom name to predefined PRT attributes. When defining parameters used by the logic modules, you can then use the custom names that you have assigned.

To assign a custom name to PRT attributes:

1. Click Tools on the RCO menu bar.
2. Select Attribute Maintenance to display the Attribute Maintenance dialog box.
3. Click to open a second Attribute Maintenance dialog box.
4. Enter the custom name in the Description field.



5. Select the associated attribute from the Attribute drop-down list.
6. Click **OK** to return to the Attribute Maintenance dialog box.
7. Click **OK** to close the dialog box.

Region Maintenance

You can use the Region Maintenance dialog box to define additional Points to be used in the RCO runtime environment. Add an entry for each region to be used in the decisions defined in your RCO configuration. An explanation of the required fields and instructions follow.

Field	Description
Region ID	Enter the ID of the new region.
Ready Mask	Value is binary and with Region Status Point value to determine if the region is ready.
Region Script	*Reserved for future expansion.*
Global Var. Point	*Reserved for future expansion.*
Enabled Point	If 0, the region is disabled; otherwise, it is enabled.
Capability Point	1 – 2 – 3 Specifies the capability of the region using attributes. These points contain a set of attribute values used to determine the capability of a region and used by the Check Process Capability function block. Type of point must be a Text point of type STRING. If the point is an array, each element of array will be scanned until a match is found for the attribute.
Quantity Point	Enter the total number of occupied locations in the region.
Quantity Value	Instead of configuring the quantity in a point, it may be configured as a single value. Routing control will first look for the point, if the point is undefined it will look for the quantity value.
Status Point	Enter the region status point from PRT. Point must be BOOL, UINT, UDINT, INT, DINT, or REAL.
Capacity Point	Enter the maximum locations a region can hold. This may be different than PRT. Point must be BOOL, UINT, UDINT, INT, DINT, or REAL.

Defining Additional Points

To define additional points:

1. From the RCO User Interface, click Tools on the menu bar.
2. Select Region Maintenance to open the Region Maintenance dialog box—see figure.
3. Click to open a second Region Maintenance dialog box.
4. Enter the Region ID or select from the drop-down list.
5. Enter the value for the Ready Mask.
6. Proceed as follows to designate the Points for the Enabled Point, Capability Point 1-2-3, Quantity Point, Status Point and Capacity Point fields:
   A. Click next to each field to browse existing Points in the project.
   B. Select the Point from the available list.
   C. Do one of the following:

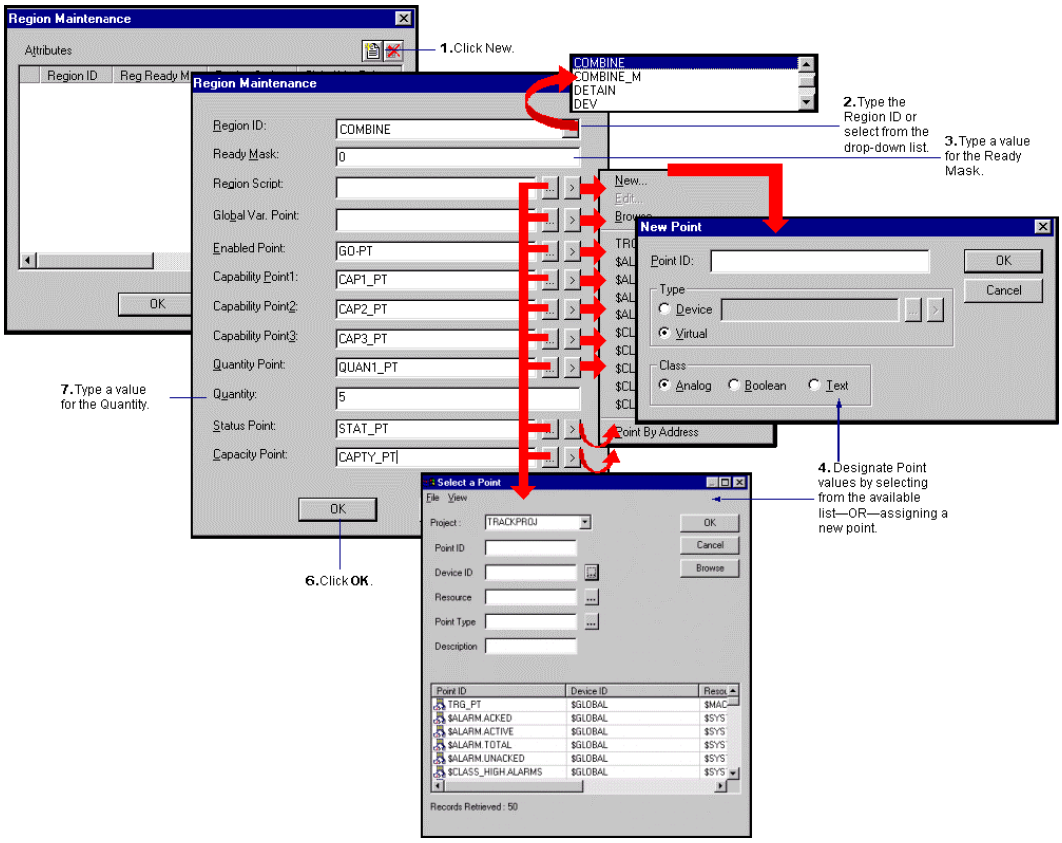
      Option 1

      Click **OK**.

      Option 2

      i. Click to designate a new Point.
      ii. Select New from the popup menu.
      iii. In the New Point dialog box, enter the Point ID.
      iv. Click the radio button for the Type: Device or Virtual.
      v. Click the radio button for the Class: Analog, Boolean or Text
      vi. Click **OK**.
7. Enter a quantity value in the Quantity field. Note that RCO will observe the Quantity Point, and then the Quantity value.

8. Click **OK** to add Points to the RCO runtime environment.



Verify Utility

Use the Verify utility to check all of the configuration data that you have entered, and to regenerate all of your output and logic modules. Once you have run the utility, you can run the Error List Utility to view any errors in the configuration. Note that your project must be running to apply this utility.

The verify utility forces a regeneration of scripts from the function block's original template.

To run the verify utility:

1. Click Tools on the menu bar.
2. Select Verify option.

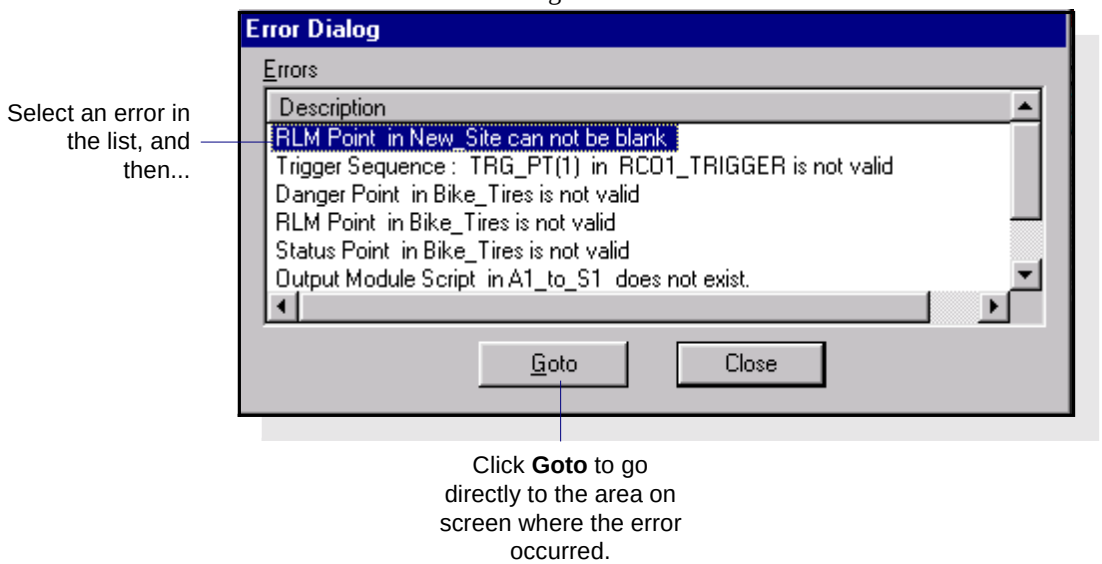
Result: Configuration data is checked for errors, and all output and logic modules are regenerated.

Error List Utility

Use the Error List utility to view errors in your configuration data. From the Error Dialog, you can also go directly to the area where the error occurred and make corrections. This provides you with an effective tool for troubleshooting RCO configuration data.

To run the error list utility:

1. Click Tools on the menu bar.
2. Select the Error List option to display the Error dialog—*see figure*.
3. Select an error in the list.
4. Click **GoTo** to display the area on screen where the error occurred.
5. Click **Close** to exit the dialog box.


Select an error in the list, and then...
Error Dialog
Errors
Description
RLM Point in New_Site can not be blank.
Trigger Sequence : TRG_PT(1) in RCO1_TRIGGER is not valid
Danger Point in Bike_Tires is not valid
RLM Point in Bike_Tires is not valid
Status Point in Bike_Tires is not valid
Output Module Script in A1_to_S1 does not exist.
Goto
Close
Click Goto to go directly to the area on screen where the error occurred.

Alarming and Logging

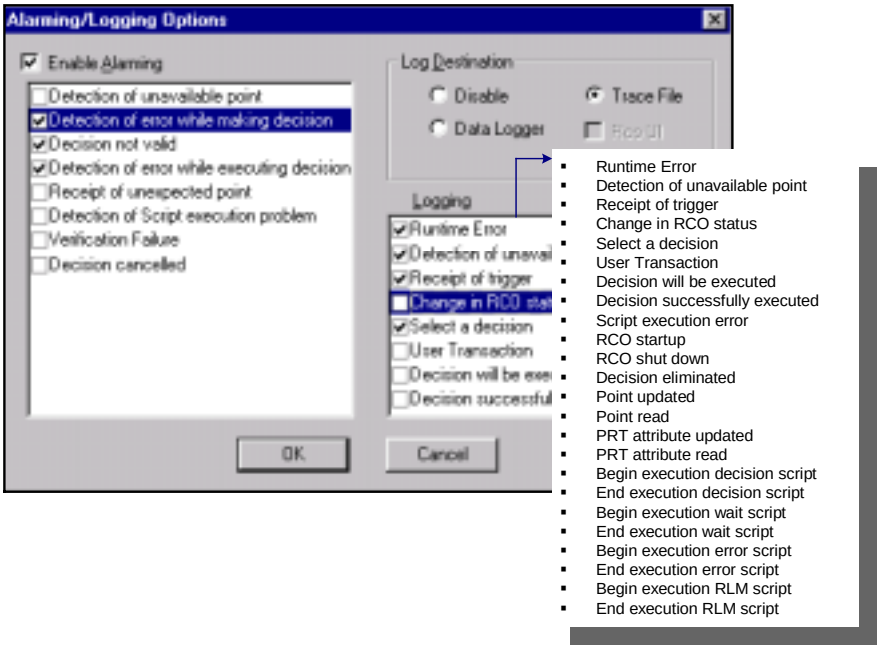
You can configure alarming and logging options from both the Tracker Configuration_UI and the RCO_UI. However, changes made from the RCO_Cfg_UI are stored in the database, but are not effected dynamically. Changes made from the RCO_UI are effected dynamically, but are not stored in the database. When configuring your alarming and logging, it is important to be mindful of those distinctions.

Important: The RCO site must be locked in order to activate the Alarming / Logging option on the popup menu.

To configure alarming and logging options:

1. Right-click the Site icon in the directory.
2. Select Alarming/Logging from the popup menu.

   The Alarming/Logging Options dialog box opens—*see figure*.



3. Check the Enable Alarming box to activate alarms.
4. Check boxes in Alarms group to activate alarm states as needed.
5. Click the appropriate radio button in the Log Destination group as follows:

Disable	Disables logging
Data Logger	Logs event to the database logger
Trace File	Logs detailed data to a trace file in the project directory with a .log extension.

6. Check boxes in the Logging group as needed.
7. Click **OK** to effect alarming and logging options, or click **Cancel** to quit operation.

Alarming Options

Once the Enable Alarming box is checked in the Alarming/Logging Options dialog box, options checked in the list box will generate alarms when those conditions are met. The available alarming options and descriptions are noted below.

Option	An alarm will be generated when…
Detection of unavailable point	RCO detects that a point is not available.
Detection of error while making decision	RCO detects an error when making a decision.
Decision not valid	RCO detects an invalid decision at a control site.
Detection of error while executing decision	RCO detects an error when executing a decision.
Receipt of unexpected point	RCO detects the receipt of an unexpected device point.
Detection of Script execution problem	RCO detects that a script is not executing properly.
Verification Failure	RCO detects a configuration error.
Decision cancelled	RCO detects that a decision has been cancelled.

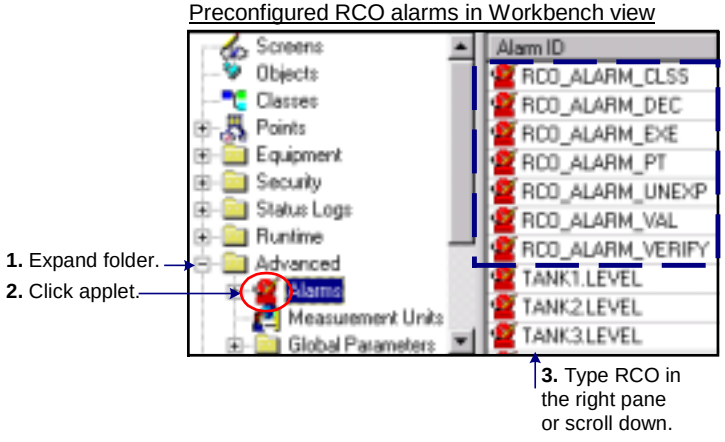
View RCO Alarms in Workbench

For your convenience all of the alarming options are supported by pre-configured RCO alarms. This saves you the trouble of having to configure an alarm for each of the conditions that you want alarmed. You can view the pre-configured alarms for your project in the Workbench.

To view RCO alarms in the Workbench:

1. Open your RCO project in the Workbench.
2. Expand the Advanced folder.
3. Click the Alarms icon to view configured alarms in the right pane of the Workbench—see figure.

Preconfigured RCO alarms in Workbench view

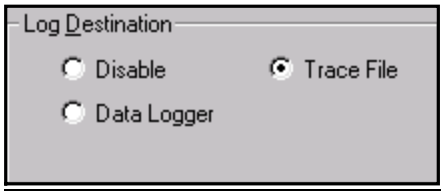


4. Position cursor in the right pane and enter RCO, or scroll through the list to view the pre-configured RCO alarms.

Tip: Modify alarm properties by double-clicking on the alarm and making changes in the Properties dialog box.

Log Destination Options

In order to activate logging options, you must select a destination for the logged data. The options in the Log Destination group each offer a different solution as explained below.



Option	Description
Disabled	This will disable logging options. You may leave your options checked in the Logging list and enable logging at a later time.
Data Logger	This will log selected events to the database logger. Data can later be used to generate reports or graphs for logged events. *See "RCO Logging Configuration" chapter for a description of how to configure the database logger.*
Trace File	This option is primarily used for troubleshooting. A detailed text-based file will be generated in the project's Log directory. It will be named with the site name and have a .log extension. All new entries are appended to the end of the file and will expand until all available hard drive space is used up. Disable this option once the RCO problem has been resolved.

Logging Options

Once a Log Destination has been specified in the Alarming/Logging Options dialog box, options checked in the Logging group will be logged when those events take place. The available logging options and descriptions are noted below.

Option	An event will be logged when…
Runtime error	There is a runtime error in the RCO system.
Detection of unavailable point	RCO detects that a point is not available.
Receipt of trigger	An RCO site is triggered.
Change in RCO status	The RCO status is changed to one of three states: Enabled, Disabled or Suspend.
Select a decision	RCO selects a decision at the control site.
User Transaction	There is a manual transaction.
Decision will be executed	A decision is to be executed at the control site.
Decision successfully executed	The decision has been successfully executed at the control site.
Script execution error	An error is generated during script execution.
RCO startup	The RCO system is started up.
RCO shut down	The RCO system is shut down.
Decision eliminated	A decision has been eliminated at the control site.
Point updated	Ever an associated point is updated at the control site.
Point read	Ever a point is read by the RCO system.
PRT attribute updated	A PRT attribute is dynamically updated.
PRT attribute read	A PRT attribute is read by the RCO system.
Begin execution decision script	The decision script begins to execute.
End execution decision script	The decision script completes execution.
Begin execution wait script	The wait script begins to execute.
End execution wait script	The wait script completes execution.
Being execution error script	The error script begins to execute.
End execution error script	The error script completes execution.
Being execution RLM script	The RLM script beings to execute.
End execution RLM script	The RLM script completes execution.

Using the RCO Runtime User Interface

About the RCO Runtime User Interface

The RCO Runtime User Interface enables you to view your control sites during runtime. Control Sites are the critical points in your production process where control decisions are made by RCO. Aside from the comprehensive data you can view about each site in the window, there are a number of other functions you can perform and other methods for viewing additional information.

Using the RCO Runtime User Interface you can:

- View control site data during runtime.
- Search for and view other sites in your project.
- Connect to other RCO projects broadcast over the network.
- Configure a new RCO profile.
- Edit an existing RCO profile.
- Change the status of a control site.
- View valid control site decisions.
- Perform manual decisions.
- Perform manual decisions.
- View detailed information about triggers and decisions.
- Reset triggers.
- Search for other control sites.
- Set alarming and logging options.

Connect the RCO Runtime User Interface

In order to launch the RCO Runtime User Interface, there must be an RCO project running with active control sites. The interface is used specifically for viewing RCO runtime data and for performing certain control functions. As always, there is enormous flexibility in launching the interface as you can launch it from a Profile file, from the RCO Runtime User Interface icon or from a Command line. All of the options are explained in detail in the next sections.

It is important to note that in order to access the Configuration dialog to create new profiles, the **`/config`** switch is needed in the Command line. The command looks like the following: **`C:\rco_ui /config <profile file>,`** where **`C`** is the drive where the RCO UI is stored.

You can connect to the RCO_UI using the following options:

Option 1. Connect to local project

Option 2. Connect to projects in an existing RCO profile

Option 3. Connect to project from the command line

Option 4. Connect to the Configuration dialog

Caution: When upgrading your CIMPLICITY software, you must upgrade your RCO projects or you may not be able to access the RCO Runtime User Interface. *See "Upgrading RCO Projects," in the "Configuring Routing Control Objects" chapter for instructions.*

Option 1. Connect to Local Project

To connect to the local project:

1. Do one of the following:

   Method 1

   A. Open your RCO project in the Workbench.

   B. Run the project.

   C. Click **Start** on the Windows task bar.

   D. Select Programs>CIMPLICITY>HMI>

.

Method 2

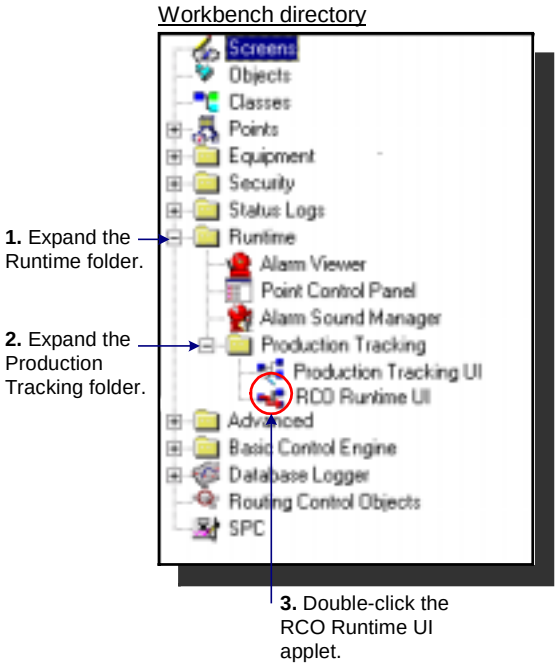
A. Open your RCO project in the Workbench.

B. Run the project.

C. Expand the Runtime folder in the Workbench directory.

D. Expand the Production Tracking folder.

E. Double-click the RCO Runtime UI icon.



The Search dialog box displays showing a list of active control sites in your local project, when you use either method.

2. Select the site you want to view.
3. Double-click the site to launch the RCO User Interface.

Note: If there is only one active control site in your local project, the Search dialog box will be bypassed and the RCO User Interface will open directly to the active site.

Tip: Place a shortcut of the RCO Runtime User Interface icon

on your desktop for quick access.

Option 2. Connect to Projects in an Existing RCO Profile

You can connect to control sites in one or more projects configured in an RCO profile. In order to connect to multiple projects, they must be enabled for broadcast over the network.

To connect to projects in an existing RCO Profile:

1. Do one of the following:

   Method 1

   A. Launch Windows Explorer.

   B. Navigate to the profile file (of type .rui).

   C. Double-click the file.

   Method 2

   A. Place a shortcut of the profile file (of type .rui) on your Windows desktop.

   B. Double-click the shortcut.

   The Search dialog box displays showing the list of active control sites in the profile, when you use either method..

2. Select the site you want to view.
3. Click **OK** to launch the RCO User Interface.

Note: there is only one active control site in the profile, or a default site is configured, the Search dialog box will be bypassed and the RCO User Interface will open directly to the active site.

Option 3. Connect to Projects from the Command Line

You can alternately connect to control sites in one or more projects using the Command line from the Start menu or in the Properties dialog box of the RCO UI icon. In order to connect to multiple projects, they must be enabled for broadcast over the network.

To connect to projects from the Command line:

1. Do one of the following:

   Method 1

   A. Place a shortcut of the RCO Runtime User Interface icon on your Windows desktop.

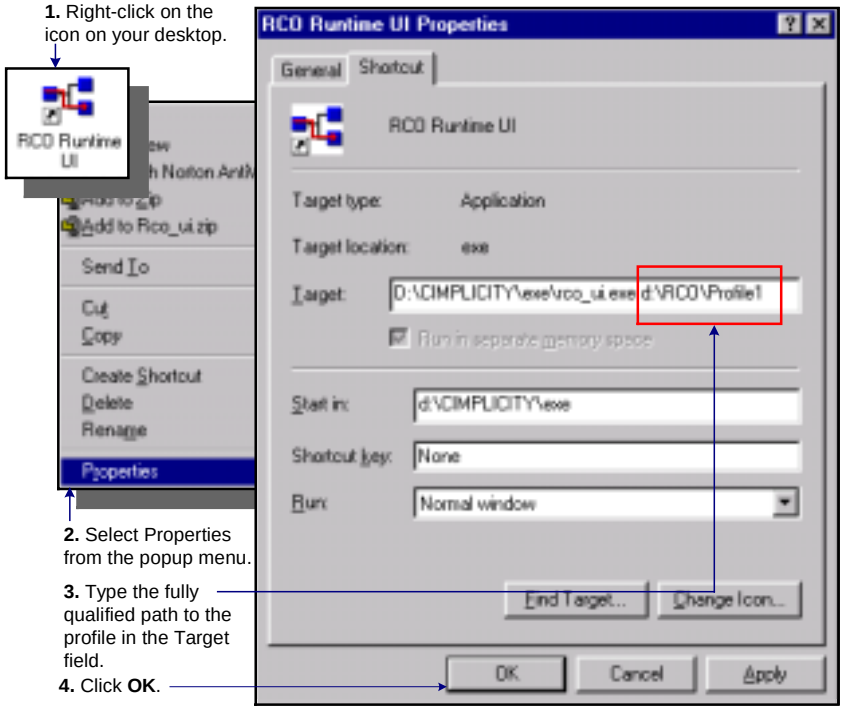
   B. Right-click on the icon and select Properties from the popup menu to display the RCO Runtime UI Properties dialog box.

   C. In the Target field, after the executable, type the fully qualified path to the profile.

   D. Click **OK**.

   E. Double-click the RCO Runtime User Interface icon.

RCO_UI Command Line



Method 2

A. Click **Start** on the Windows task bar.

B. Select Run to display the Run dialog box.

C. Enter **`rco_ui`** and the fully qualified path to the profile file, e.g. **`rco_ui d:\RCO\Profile1`**.

D. Click **OK**.

The Search dialog box displays showing the list of active control sites in the profile, when you use either method.

2. Select the site you want to view.
3. Click **OK** to launch the RCO User Interface.

Note: If there is only one active control site in the profile, or a default site is configured, the Search dialog box will be bypassed and the RCO User Interface will open directly to the active site.

Option 4. Connect to the Configuration Dialog

If you want to configure a new profile, or edit an existing profile, you must use the switch **`/config`** in the command in order to activate the Configure option in the RCO Runtime User Interface.

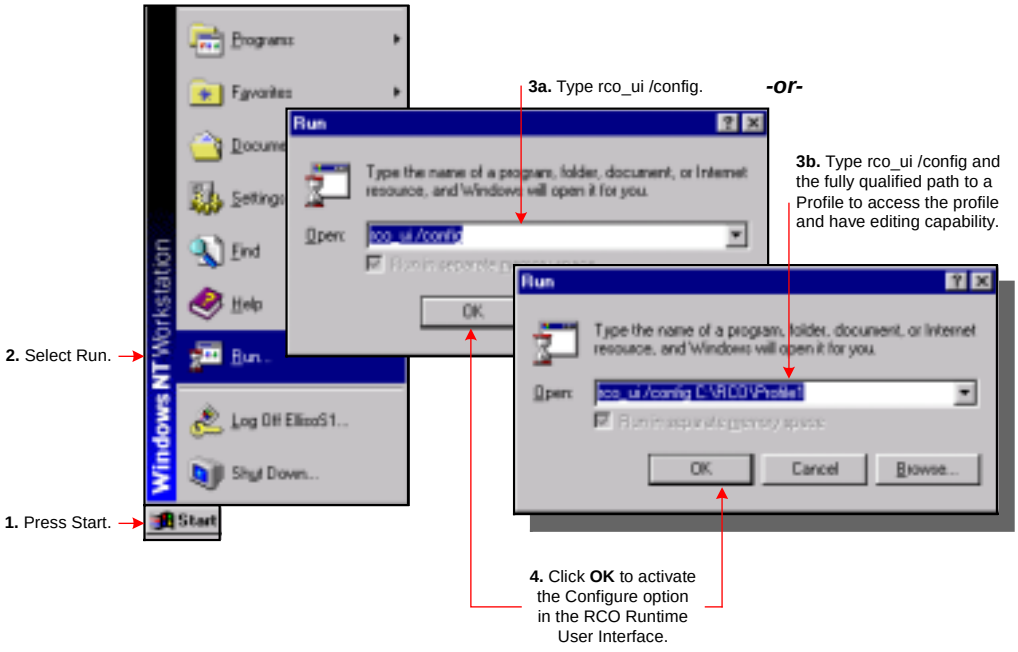
To connect to the configuration dialog:

Method 1

1. Place a shortcut of the RCO Runtime User Interface icon on your Windows desktop.
2. Right-click on the icon and select Properties from the popup menu to display the RCO Runtime UI Properties dialog box.
3. In the Target field, after the executable, do one or the other:
   - Enter **`/config`** to connect to the local project, e.g. **`C:\CIMPLICITY\exe\rco_ui.exe /config`**.
   - Enter **`/config`** and the fully qualified path to the profile to connect to the specified profile, e.g. **`C:\CIMPLICITY\exe\rco_ui.exe /config C:\RCO\Profile1`**.
4. Click **OK**.
5. Double-click the RCO Runtime User Interface icon.

Method 2

1. Click **Start** on the Windows taskbar.
2. Select Run to display the Run dialog box.
3. In the Open field, after the executable, do one or the other:
   - Enter **`rco_ui /config`** to connect to the local project, e.g. **`rco_ui /config`**.
   - Enter **`rco_ui /config`** and the fully qualified path to the profile to connect to the specified profile, e.g. **`rco_ui /config C:\RCO\Profile1`**.


3a. Type rco_ui /config.
-or-
3b. Type rco_ui /config and the fully qualified path to a Profile to access the profile and have editing capability.
2. Select Run.
1. Press Start.
4. Click OK to activate the Configure option in the RCO Runtime User Interface.
Run
Open:
OK
Cancel
Browse...
Windows NT Workstation
Start

4. Click **OK**.

Result: Using either method, the Configure option on the RCO UI is enabled. You can either create a new profile or edit an existing profile.

See "Configure Profile" for the procedure to create or edit an existing profile from within the RCO Runtime UI, or see "Create an RCO Profile" for the procedure to create a profile using a text editor.

Select the Control Site

Commonly when the RCO Runtime User Interface is invoked, the Search dialog box will open showing a list of all the sites configured in the profile or the local project. You can view runtime data for one control site at a time by selecting it from the list in the Search dialog box.

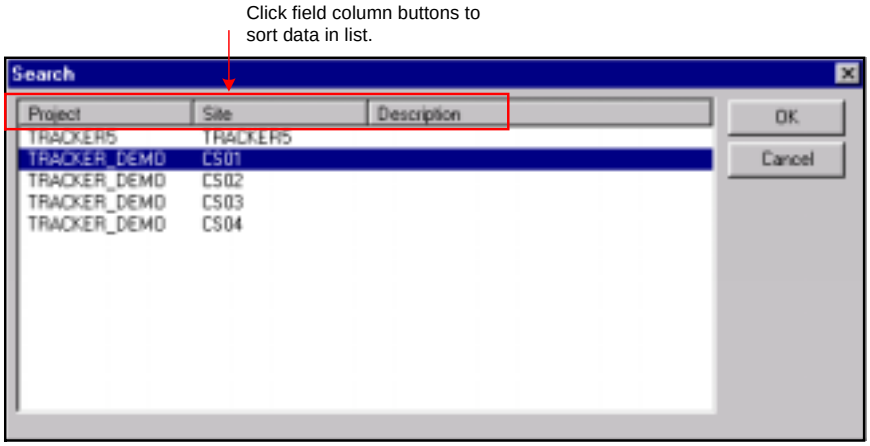
The Search dialog box will be bypassed when:

- A default site has been configured in a profile.
- Only one site has been configured in a profile.
- The local project only has one active site.

To view a control site in the RCO user interface:

1. Invoke the RCO user interface using one of the appropriate options *(see "Open the RCO Runtime User Interface" for options).*

Result: The Search dialog box will display showing a list of all the configured sites in the profile or the local project.



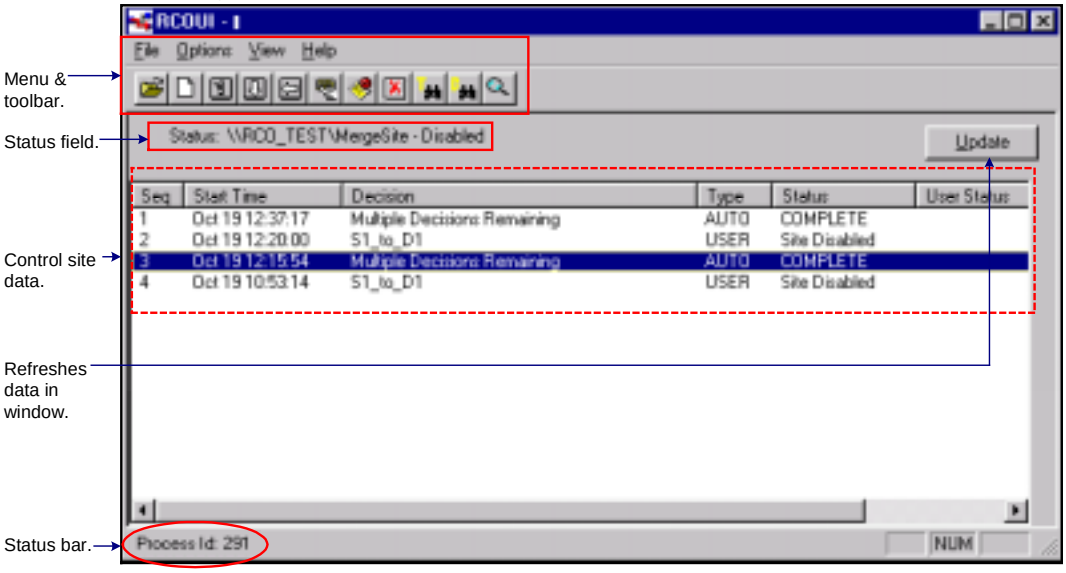
2. Select the site from the list to be viewed in the RCO user interface.
3. Double-click the site or click **OK** to launch the RCO user interface and view runtime data about the site.

Note: The column headings in the Search dialog box are active control buttons that, when clicked, can be used to rearrange the items in the list.

RCO_UI Window

The RCO_UI Window provides you with detailed information about the selected control site in your project. All of the active control decisions are listed in the window and are automatically updated periodically by RCO. The columns, toolbar, status line and menu items are explained in detail below—*see figure*.

RCO UI window detailing control site information.


Menu & toolbar.
Status field.
Control site data.
Refreshes data in window.
Status bar.
RCOUI - I
File Options View Help
Status: \\RCO_TEST\MergeSite - Disabled
Update
Seq Start Time Decision Type Status User Status
1 Oct 19 12:37:17 Multiple Decisions Remaining AUTO COMPLETE
2 Oct 19 12:20:00 S1_to_D1 USER Site Disabled
3 Oct 19 12:15:54 Multiple Decisions Remaining AUTO COMPLETE
4 Oct 19 10:53:14 S1_to_D1 USER Site Disabled
Process Id: 291
NUM

Status Field

The Status field displays the qualified path of the selected control site and its status. The status of the control site will determine which functions are available from the within the RCO_UI window. Functions that are not available appear dimmed on menus and the toolbar.

Valid status for a control site can be:

Enabled	Locations automatically make and execute control decisions and manage production flow.
Disabled	Locations do not execute control decisions or manage production flow. Manual commands are required from the operator.
Suspend	Locations continue to execute current cycle, but will not re-trigger.

Status Bar

The status bar, located at the bottom of the window, provides additional information about the selected control site. The most common messages include, but are not limited to the following:

- Process ID
- Waiting on Verification Point
- Verification Point timeout
- Control Location currently not available

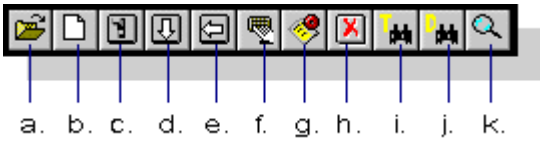
Control Site Data

The control decisions for the selected control site are displayed in the window in column format. Each column represents a field of data for the line item decisions in the list. The following information is available:

Seq	Number of the decision for the control site. RCO uses a consecutive numbering scheme.
Start Time	Date and time the decision cycle started.
Decision	Decision on which the control cycle is working.
Type	Source of the decision as follows:
	Manual Initiated by a user.
	Automatic Initiated by RCO.
Status	Current status of the decision to include one of the following types:
	Pending – control site disabled; decision waiting to be released.
	Execute Executing.
	Complete Completed.
	Failed Failed to execute.
	Unknown Status of decision is not known.
	In process Awaiting asynchronous validation.
	Canceled Canceled.

Toolbar

The buttons on the toolbar provide one-click access to the most commonly used functions. They are described as follows:



a.	Open	Open window displays for opening a profile.
b.	Configure	Launches the Configuration dialog box for editing a profile.
c.	Enable Control Site	Toggles the status of the selected control site.
d.	Manual Control	Enables manual control decisions. Dimmed when site is disabled.
e.	Reset Trigger	Resets a control site trigger source.
f.	Manual Trigger	Manually trips the selected trigger.
g.	Alarming/Logging	Launches the Alarming/Logging Options dialog box.
h.	Cancel Decision	Cancels selected decisions, when 'in process'.
i.	Triggers	Launches the Control Site Triggers Display dialog box.
j.	Decisions	Launches the Valid Control Site Decisions dialog box for the selected control site.
k.	Search	Launches the Search dialog box.

Note: The **Configure** button is only active on the toolbar when the **`/config`** switch is used on the Command line. *See "Option 4: Connect to Configuration Dialog" for instructions.*

Menu Bar

You can use the menu options to edit a profile, reset a trigger, perform a search in the RCO database, or display Help for using the RCO Runtime User Interface.

File Menu

Open	Open window displays for opening a profile.
Configure…	Launches the Configuration dialog box for editing a profile.
Exit	Quits the application.

Options Menu

Enable Ctrl Site	Toggles the status of the selected control site.
Suspend Site	Suspends the selected control site. Current cycle continues to execute, but will not re-trigger.
Manual Control	Enables manual control decisions when the control site is DISABLED.
Reset Trigger	Resets a control site trigger source.
Manual Trigger	Manually trips the selected trigger.
Alarming/Logging	Launches the Alarming/Logging Options dialog box.
Cancel Decision	Cancels selected decisions when 'in process'.

View Menu

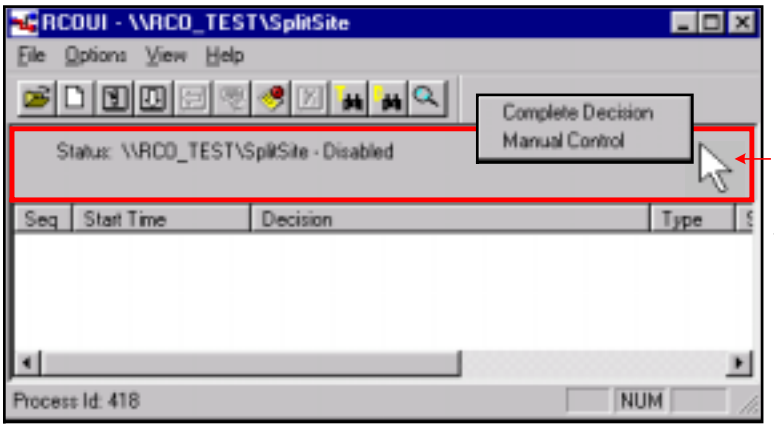
Toolbar	Check mark indicates toolbar is displayed in the RCO_UI.
Status Bar	Check mark indicates status bar is displayed in the RCO_UI.
Triggers	Launches the Control Site Triggers Display dialog box.
Decisions	Launches the Valid Control Site Decisions dialog box for the selected control site.
Search	Launches the Search dialog box.

Note: The Configure option is only active on the menu bar when the **`/config`** switch is used on the Command line. *See "Option 4: Connect to Configuration Dialog" for instructions.*

Popup Menu

In order to access the popup menu from the RCO Runtime UI, place the cursor in the Status box and right-click.

Complete Decision	Complete the pending decision for the control site.
Manual Control	Launches the Manual Control dialog box. The site must be disabled for this option to be active on the menu.



Open Profile

You can open other profiles in the RCO User Interface using the Open command.v

To open a profile:

Method 1 – File menu

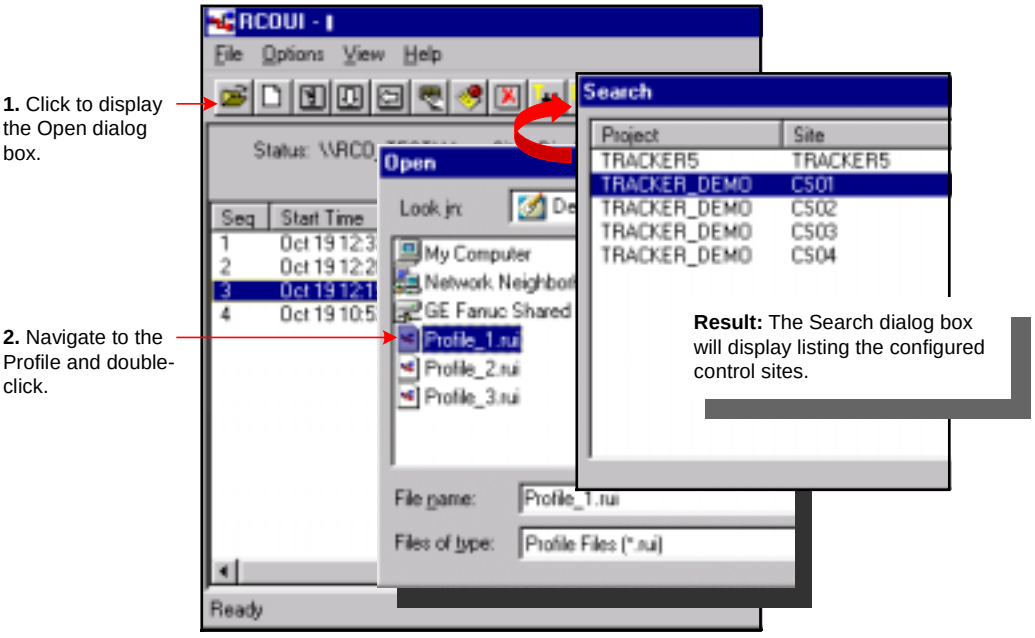
1. Click File on the menu bar.
2. Select Open option to launch the Open dialog box.
3. Navigate to the profile (must have .rui extension).
4. Double-click on the profile icon.

Method 2 – Toolbar button

1. Click to launch the Open dialog box.
2. Navigate to the profile (must have .rui extension).
3. Click on the profile in the window.
4. Click **Open**.

Result: Using either method, the Search dialog box will open listing the control sites configured for the profile. Select a control site from the list to view in the RCO Runtime User Interface.

Example of opening profile using toolbar button



Note: If there is only one active control site in the profile, or a default site is configured, the Search dialog box will be bypassed and the RCO User Interface will open directly to the active site.

Configure a Profile

In order to configure a new profile or to edit an existing profile, you must use the **`/config`** switch on the command line of the Run dialog box or the RCO Runtime UI Properties dialog box. When the RCO Runtime UI is accessed using this switch, the Configure option on the File menu is enabled allowing configuration of a new or existing profile. *See "Option 4: Connect to Configuration Dialog" for complete instructions.*

To configure a profile:

1. Do one of the following:

   Method 1 – File menu

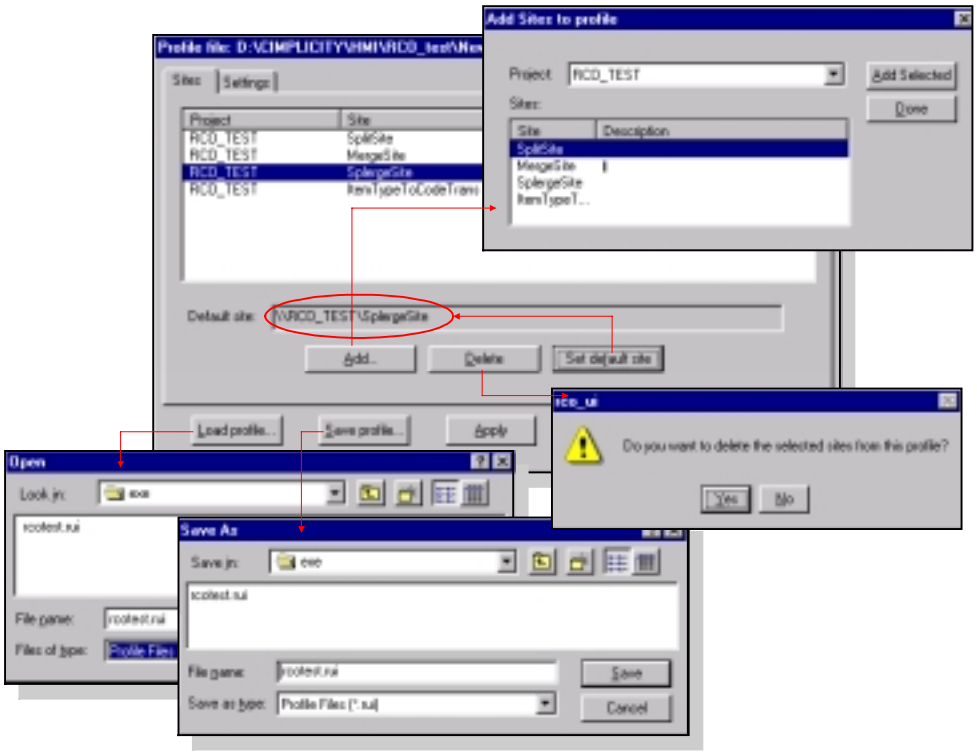
   A. Click File on the menu bar.

   B. Select Configure.

   Method 2 – Toolbar button

   Click ☐ on the toolbar..

Result: Using either method, the Profile file dialog box will display showing the list of configured sites for the local project, or for the profile opened when accessing the RCO Runtime UI*—see figure.*



2. (*Optional*) Perform a number of functions from the Profile file dialog box to configure an RCO profile. Proceed as follows:
3. Click Sites tab.

Create a New Profile

1. Click **Load profile** to display the Open dialog box.
2. In the File name field, type a name for your new profile.
3. Navigate to the folder in your directory to store the profile.
4. Click **Open** to create a blank profile file in the selected directory.

Load an Existing Profile

1. Click **Load profile** to display the Open dialog box.
2. Navigate to the folder in your directory where the profile is stored.
3. Double-click on the file to display its configuration in the Profile file window.

Add Sites to a Profile

1. Click **Add** to display the Add Sites to profile dialog box.
2. Select a Project from the drop-down list. Note that in order to access the project, it must be broadcast over the network, and you may be required to have a user name and password.
3. Select the site to be added to the profile. Use the **Ctrl** key to select multiple sites.
4. Click **Add Selected** to move the selected sites into the Profile file box.
5. Repeat steps 2-4 to add sites from other projects.
6. Click **Done** when you are through adding sites to the profile.

Delete Sites from a Profile

1. Select the site to be deleted from the list. Use the **Ctrl** key to select multiple sites.
2. Click **Delete** to display a message box.
3. Click **Yes** to delete the sites from the profile, or click **No** to cancel the operation.

Set a Default Site for a Profile

1. Select the site to be used as the default site in the profile. Note that when this profile is accessed, the Search dialog box will be bypassed and the default site will display automatically.
2. Click **Set default site** and the qualified path to the site will display in the Default site field.

Note: You can override the default site set in the profile by repeating the above procedure. It is not necessary to delete the default site first and then set a new one.

Delete a Default Site from a Profile

1. Place the cursor in the Default site field.
2. Click **Delete default site** and the site will be removed from the Default site field.

Note: When the cursor is placed in the Default site field, the **Set default site** button toggles to **Delete default site** automatically.

Save a Configured Profile

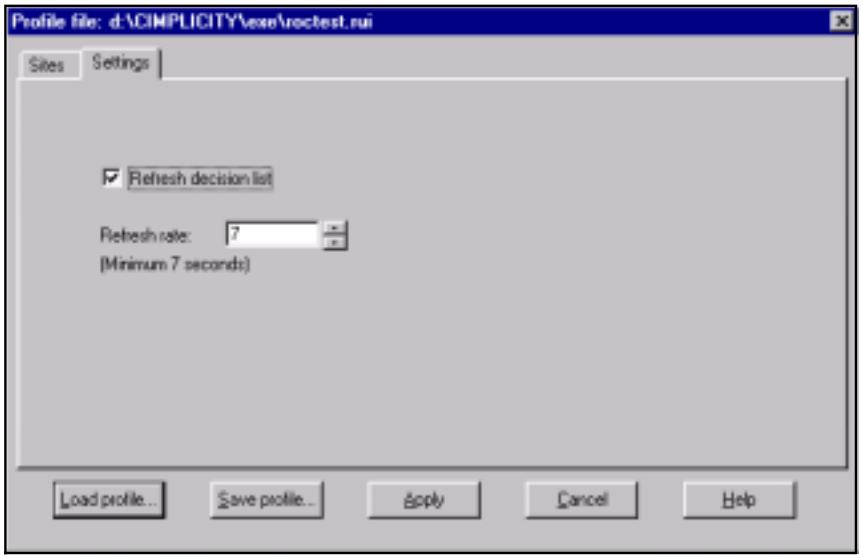
1. Click **Save profile** to display the Save dialog box.
2. Type the name of the profile in the File name field.
3. Navigate to the folder in your directory to store the profile.
4. Click **Save** to save the profile file in the selected directory.

Configure Settings for a Profile

To configure settings for a profile:

1. Select the Settings tab.
2. Check Refresh decision list to enable automatic updates of the information in the RCO UI for the configured control sites.
3. Type in or use the arrows to set the Refresh rate in seconds to indicate how often the RCO UI should automatically update information.

Note: The buttons on the bottom of the window perform the same functions in the Sites tab.



Manually Create an RCO Profile

You can create an RCO Profile using the text editor of your choice, or in the Runtime User Interface. In your profile, you can choose to add sites from one project or from multiple projects. In order to connect to multiple projects, they must be enabled for broadcast over the network.

A profile created in a text editor or in the RCO UI will have the same basic format. There are two sections delineated in the profile: System and Sites, each of which have associated fields. The System fields determine the configuration of the profile. The Site fields determine the project or projects and their corresponding sites. Sites listed in the profile are available for viewing in the RCO Runtime User Interface when the profile is accessed.

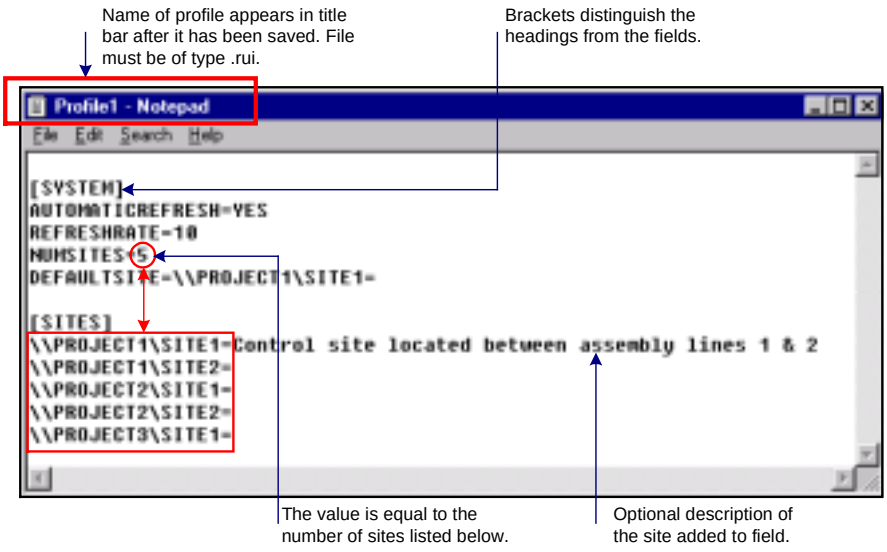
Field Name	Value	Description
AUTOMATICREFRESH	YES NO	Determines whether the RCO UI will automatically refresh the decision list at the indicated rate. RCO UI defaults to value 'YES' if this field is left out of the profile. A'NO' value is required if you want to disable automatic refresh, which forces manual update from the interface. This field is optional.
REFRESHRATE	Integer	The rate at which the RCO UI should refresh the decision list in seconds. The minimum value is 7, and is the default unless otherwise specified. This field is optional.
NUMSITES	Integer	Indicates the item count of the number of sites configured in this profile. This field is required.
DEFAULTSITE	Project/ Site	When this profile is accessed, the RCO UI will open directly to the control site designated in this field. This field is optional.
SITES	Project/ Site	Each site name is listed individually, and is fully qualified by the project name and the site name. Optionally a description of the site can be added.

To create an RCO profile using a text editor:

1. Launch a text editor, for example Notepad.
2. Type the heading SYSTEM enclosed in brackets [ ] to distinguish it from the fields of information, i.e. [SYSTEM].
3. On the next line, type AUTOMATICREFRESH= and the value Yes to enable the RCO UI to automatically refresh the decision list, or No to disable the feature and force manual updates, e.g. AUTOMATICREFRESH=YES.
4. On the next line, type REFRESHRATE= and the value in seconds to automatically refresh the decision list, e.g. REFRESHRATE=10.

   Note: This field is not required if you entered value, 'NO' in the AUTOMATICREFRESH field, or if you want to use the default value of 7 seconds.

Example of Profile created manually in text editor


Name of profile appears in title bar after it has been saved. File must be of type .rui.
Brackets distinguish the headings from the fields.
Profile1 - Notepad
File Edit Search Help
[SYSTEM]
AUTOMATICREFRESH=YES
REFRESHRATE=10
NUMSITES=5
DEFAULTSITE=\\PROJECT1\SITE1=
[SITES]
\\PROJECT1\SITE1=Control site located between assembly lines 1 & 2
\\PROJECT1\SITE2=
\\PROJECT2\SITE1=
\\PROJECT2\SITE2=
\\PROJECT3\SITE1=
The value is equal to the number of sites listed below.
Optional description of the site added to field.

5. On the next line, type NUMSITES= and the number of sites you plan to add to this profile. If unsure, leave blank for now and fill in later, e.g. NUMSITES=5.
6. On the next line, type DEFAULTSITE= and the fully qualified project name and site name of the control site that you want to automatically default to when you access the RCO UI using this profile, e.g. DEFAULTSITE=\\PROJECT1\SITE1=.
7. Press **Enter** twice to leave a blank line between the sections.
8. Type the heading SITES enclosed in brackets [ ] to distinguish it from the fields to follow, i.e. [SITES].
9. On the next line, type the fully qualified project name and site name formatted as follows: \\PROJECTNAME\SITENAME=, e.g. \\PROJECT1\SITE1=.
10. Optionally, you can add a description of the site after the '=' sign, e.g. \\PROJECT1\SITE1=Control site located between assembly lines 1 & 2.
11. Repeat 9 and 10 in this procedure for each site that you add to the profile. When all the sites have been added, ensure that the NUMSITES field is updated with the accurate site count.
12. Click File on the menu bar.
13. Select Save As to launch the Save As dialog box.
14. Navigate to the directory where the profile is to be stored.
15. In the File Name field, type the name of the profile and **`.rui`** as the extension. The file *must* be a **`.rui`** file.
16. Click **Save** to save your profile.

Caution: If the value of the NUMSITES field is less than the actual number of sites listed, the Search dialog box will only display the number of sites indicated in the field. When updating the profile using the text editor, be sure to update the NUMSITES field with the accurate site count.

Additional Functions for an RCO Site

With a control site displayed in the user interface, you can perform a number of functions to interact with and direct how the site functions. You can control triggers and decisions in the runtime environment using the menu and toolbar commands.

You can:

- Change the status of a control site.
- View valid control site decisions.
- Perform manual decisions.
- Cancel decisions.
- View triggers
- Perform manual triggers
- Reset triggers
- Search for control sites
- Set alarming and logging options.

Changing the Status of a Control Site

You can change the status of a control site if you have access privileges. You can select between three status options.

Status	Description
Enabled	RCO is running control site. Site can be triggered and decisions executed automatically. Manual Control option is disabled.
Disabled	Site is not running. Triggers and decisions in progress do not finish cycle. Manual Control option is enabled.
Suspend	Current cycle runs to completion. Site will not re-trigger. Manual Control option is disabled.

To change the status of a control site:

Enable Control Site

1. While in the RCO_UI, click Options on the menu bar.
2. Select Enable Control Site.

Result: A check mark displays next to the menu option indicating it is the active option.

Disable Control Site

1. While in the RCO_UI, click Options on the menu bar.

   Enable Control Site is active (checked).
2. Select Enable Control Site.

Result: The check mark is removed from the menu option indicating that it is no longer the active option.

Suspend Control Site

1. While in the RCO_UI, click Options on the menu bar.
2. Select Suspend Control Site.

Result: A check mark displays next to the menu option indicating it is the active option.

Check mark indicates active option.

Tip: Use the **Enable Control Site** button to toggle between Enable and Disable Control Site status.

Status Error Conditions

If you cannot change the status of the control site, the RCO system will generate an error message.

- If the following error message displays,

  "Selected Control Site is not currently accessible,"

  Then

  The RCO process required to carry out the request is not currently online. This could indicate a problem with RCO.

- If the following error message displays,

  "Status Change or Cancel currently pending,"

  Then

  The request to change the status at this location has already been submitted, or the current status change is pending completion of the control cycle in progress.

Managing Decisions

Using the menu options and toolbar buttons, you can view and manage decisions for a control site.

You can:

- View valid control site decisions.
- Perform manual decisions.
- Cancel decisions.

View Valid Control Site Decisions

You can view all of the valid control site decisions in a dialog box. Decisions can then be controlled using the function buttons and checkboxes.

To view valid control site decisions:

1. Do one of the following:

   Method 1 – View menu

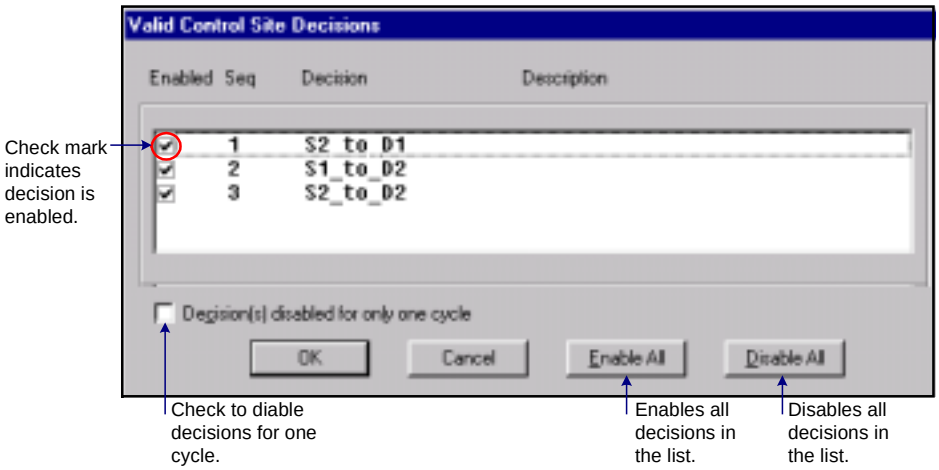
   A. Click View on the menu bar.

   B. Select Decisions.

   Method 2 – Quickest

   Click the **Decisions** button on the toolbar.

   The Valid Control Site Decisions dialog box displays when you use either method.



2. Use the function buttons and checkboxes to control decisions as follows:

To…	Then…
Disable one decision,	Clear the checkbox next to the decision.
Disable decisions for one cycle	Check the Decision(s) disabled for only one cycle box.
Disable all decisions,	Click **Disable All**.
Enable one decision,	Check the box next to the decision.
Enable all decisions,	Click **Enable All**.

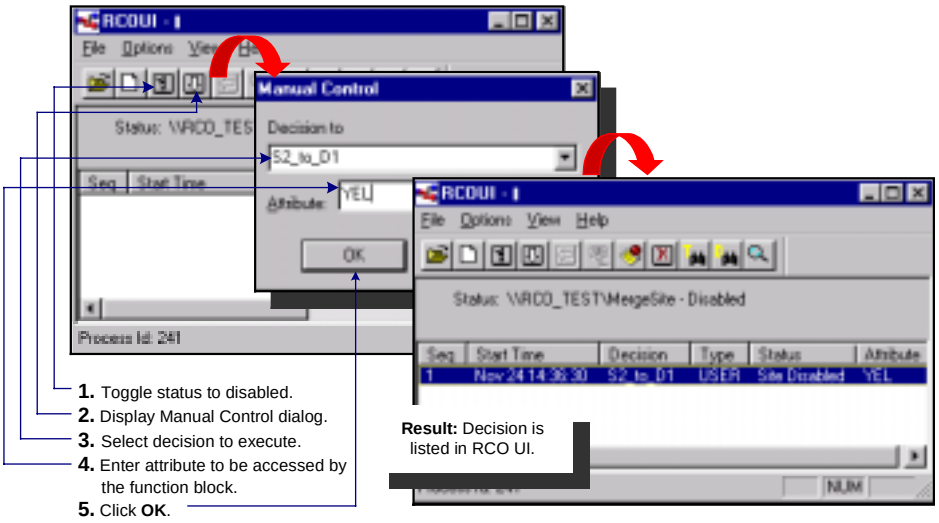
Perform Manual Decisions

To perform manual decisions:

1. If the site is enabled (indicated in the Status field), click on the toolbar to disable the control site and to activate the Manual Control option.
2. Click on the toolbar to display the Manual Control dialog box.
3. Select a Decision to execute from the drop-down list.
4. (*Optional*) in the Attribute field, type an attribute to be examined by the function block.

Result: The decision will display in the main window.

Example of performing a manual decision using toolbar button



Decision Error Conditions

When performing a manual decision, certain conditions within the RCO system will generate an error message.

If the following error message displays,

"Selected Control Site is not currently accessible,"

Then

The RCO process required to carry out the request is not currently online. This could indicate a problem with RCO.

Cancel Decisions

You can elect to cancel a decision to stop it from executing using the Cancel decision function.

To cancel a decision:

Method 1 – Options menu

1. Select the decision in the RCO_UI.
2. Click Options on the menu bar.
3. Select Cancel Decision.

Method 2 – Quickest

1. Select the decision in the RCO_UI.
2. Click the **Cancel Decision** button on the toolbar.

Result: Using either of the above methods, the selected decision will stop executing at the control site.

Managing Triggers

Using the Control Site Trigger Display dialog, you can view and manage triggers for a control site.

You can:

- View trigger details.
- Trip a trigger manually.
- Reset a trigger.

View Trigger Details

Launch the Control Site Trigger Display dialog box to view the details of a trigger.

To view trigger details:

Method 1 - Quickest

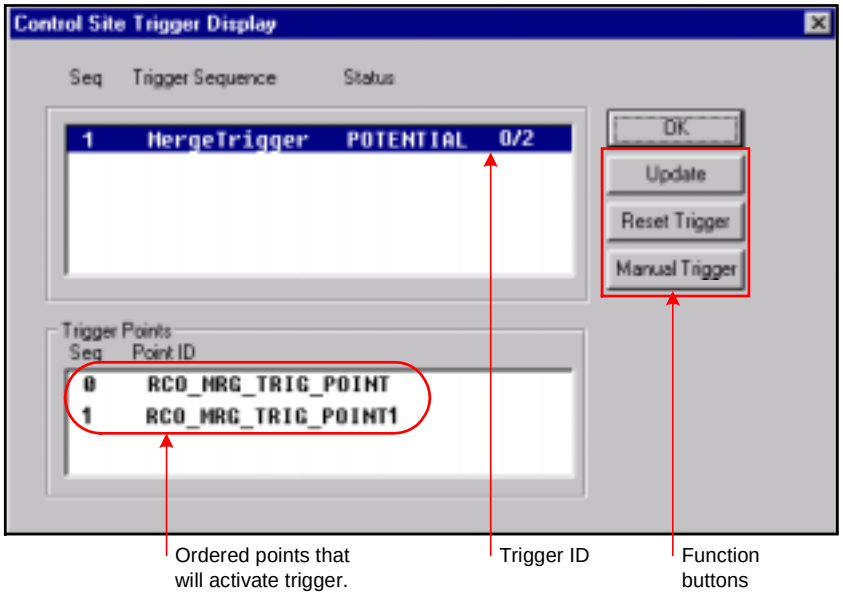
From the Control Site display, click **Triggers** button .

Method 2 – View menu

1. Click View on the Control Site menu bar.
2. Select .

Result: Using either method, the Control Site Trigger Display is launched.

Example of trigger details view



Tip: Click the **Update** button to refresh the status of the Triggers listed in the dialog box.

Trigger Details

The Control Site Trigger Display dialog box provides you with information about the Triggers configured for a control site. The Triggers are listed in the top group of the dialog box in numeric sequence. When a Trigger is selected, its associated points are displayed in the Trigger Points group—*see above figure*.

You can view the following details about Triggers in the top group of the dialog box:

Column	Description
Seq	Order of the Triggers in numeric sequence
Trigger Sequence	Trigger ID
Status	Current status of the trigger. Ratio determines the number of points triggered as compared to the number of points configured for the trigger. **Example** There are 3 configured points – 0/3. Two points have triggered 2/3. Ratio = two of three points have triggered with one point remaining. **Status Codes** Potential: Trigger values match the trigger sequence so far. Control site will potentially trigger. Additional data values are needed to determine if the site will trigger. Eliminated: Trigger values do not match the trigger sequence and therefore the site will not trigger. Triggered: Trigger values match the trigger sequence and the site is triggered.

Trigger Points Details

Each Trigger has at least one associated point that must be activated in order to trigger the site. If there is more than one associated point, then all of the points in the sequence must be activated to trigger the source.

In order to view Trigger Points, select the Trigger in the top group of the dialog box. The associated points will display in the Trigger Points group.

Column	Description
Seq	Numeric order of the points as they must be activated to trigger the control site.
Point ID	ID for the associated point.

Trigger Error Conditions

If you cannot launch the Control Site Trigger Display dialog box, the RCO system will generate an error message.

If the following error message displays,

"Selected Control Site is not currently accessible,"

Then

the RCO process required to carry out the request is not currently online. This could indicate a problem with RCO.

Manual Triggers

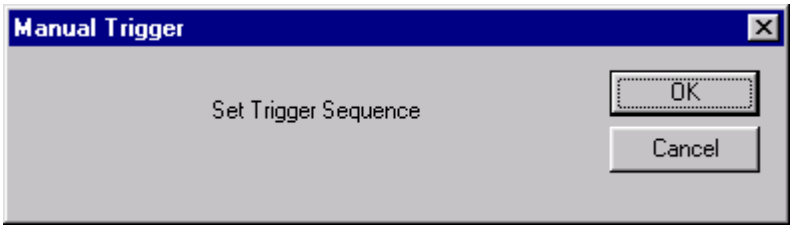
You can manually trip a trigger for a control site in the Control Site Trigger Display dialog box. When a trigger is manually tripped, the status will be reflected in the top group of the dialog box adjacent to the selected trigger. Also, as the ratio of points activated to the total number of Trigger points changes, the progression will display in the status field.

To manually trip a trigger:

1. In the Control Site Trigger Display dialog box, select the Trigger to be manually tripped.
2. Click **Manual Trigger**.

   A confirmation box will display.
3. Click **OK** in the confirmation box to set the trigger sequence. Click **Cancel** to quit the operation.

Result: The Trigger will be tripped and the resulting status and point ratio will display.



Manual Trigger Error Conditions

If you cannot manually trip the trigger, the RCO system will generate an error message.

- If the following error message displays,

  "Selected Control Site is not currently accessible,"

  Then

  The RCO process required to carry out the request is not currently online. This could indicate a problem with RCO.

- If the following error message displays,

  "Source is already triggered.,"

  Then

  The source is already in a triggered state and cannot be triggered again.

Reset Triggers

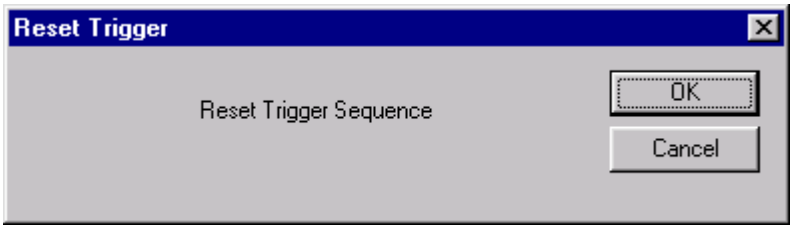
You can reset a trigger, returning the source to a non-triggered state and restarting the trigger sequence.

To manually trip a trigger:

1. In the Control Site Trigger Display dialog box, select the Trigger to be reset.
2. Click **Reset Trigger**.

   A confirmation box will display.
3. Click **OK** in the confirmation box to reset the trigger sequence. Click **Cancel** to quit the operation.

Result: The Trigger will be returned to a non-trigger state and the trigger sequence will be restarted. The resulting status and point ratio will display.



Reset Trigger Error Conditions

If you cannot launch the Control Site Trigger Display dialog box, the RCO system will generate an error message.

- If the following error message displays,

  "Selected Control Site is not currently accessible,"

  Then

  The RCO process required to carry out the request is not currently online. This could indicate a problem with RCO.
- If the following error message displays,

  "Source is already triggered.,"

  Then

  The source is already in a triggered state and cannot be triggered again.

Searching for Control Sites

You can search for a control site and view its runtime data in the RCO_UI using the search function.

To search for a control site:

1. Do one of the following:

   Method 1 – View menu

   A. Click View on the menu bar.

   B. Select Search to launch the Search dialog box.

   Method 2 – Quickest

   Click the **Search** button on the toolbar to launch the Search dialog box.

2. Select the control site from the list in the Search dialog box.
3. Click **OK** to view its runtime data in the RCO_UI, or click **Cancel** to quit the operation.

General Error Conditions

If an incorrect value is entered, the RCO system will generate an error message.

If the following error message displays,

"Invalid Selection,"

Then

Make the correct selection to carry out the request.

Setting Alarming and Logging Options

You can specify alarming and logging conditions using the Alarming / Logging Options dialog box. Check the options in the alarming group and logging group as needed to keep you apprised of the status of your RCO system during runtime.

See the previous chapter, "Configuring Routing Control Objects," "Alarming and Logging" topic for additional information about the alarming and logging options.

Important: Changes made to the Alarming / Logging Options from the RCO_UI are not saved to the database. Changes are effected dynamically for this instance of RCO_UI only. Go to the **RcoCfg_UI** to set alarming and logging options that will be saved to the RCO configuration.

To set alarming and logging options:

1. Do one of the following:

   Method 1 – Options menu

   A. Click Options on the menu bar.

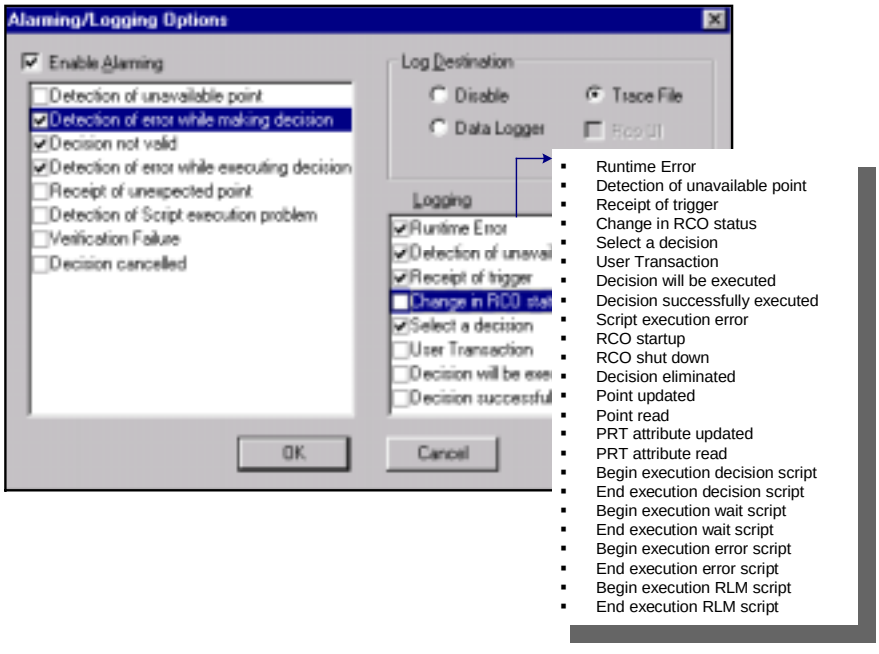
   B. Select Alarming/Logging.

   Method 2 – Quickest

   Click the **Alarming/Logging** button on the toolbar.

   The Alarming / Logging Options dialog box is launched.

2. Check Enable Alarming to activate alarming.



3. In the list box, check the options for which an alarm should be generated.

4. In the Log Destination group, designate the destination for the logged entries by clicking the appropriate radio button as follows:

Disable	Disables logging
Data Logger	Logs event to the database logger
Trace File	Logs detailed data to a trace file in the project directory with a .log extension.

5. In the Logging group, check the options for an entry should be logged.
6. Click **OK** to effect changes, or click **Cancel** to quit operation.

RCO Logging Configuration

Overview

RCO data logging uses the ODBC Data source configured for CIMPLICITY alarm logging. Configuration consists of editing your project's **`datalog.idt`** and **`data_field.idt`** files (see "Configuration Requirements" for directions on this process) to create the tables and table fields necessary for the RCO attributes you wish to log.

Database Logger Tables for RCO

An RCO logs data to a different table for each control location in the system. The name of each table will be the same as the name of the corresponding control location. They must be configured in the **`datalog.idt`** file in order for any of their fields to be logged. The tables are independent of one another, so only those necessary for the specific data you want logged need to be configured.

Database Logger Table Fields for RCO

The following list details the allowed fields which can be logged by an RCO to each of the control location tables. These fields are configured by editing the **`data_field.idt`** file. The logging configuration requires no specific fields, so you may use only those fields your application requires.

Operation	Type of operation performed.
Decision_Name	Text name of the executed decision.
Attribute_Value	Attribute value of the executed decision.
Cycle_Time	Time at start of control cycle.
Transaction_Type	For manual transactions: Type of transaction performed.
User_Name	For manual transactions: User performing transaction.
Validation_Override	Indicates that a manual transaction has overridden decision validation.
Point_Id	Name of a point monitored by the control location which has become unavailable.
Data_Name	For unexpected/unavailable points: Name of point read by control location.

Control_Location	For unexpected/unavailable points: Control location name
State	For unexpected points: One of ten valid control location states.
Trigger_Source	Trigger detected: Name of trigger source.
Trigger_Sequence	Trigger detected: Name of trigger sequence received.
Trigger_Type	Trigger detected: Manual/Automatic trigger.
Old_Status	For control location state change: Old Status
New_Status	For control location state change: New Status

RCO Logging Configuration Files

The nature of RCO database logging is such that the fields for a given entry in the **.idt** files will be the same across most platforms and projects. Therefore, the following sections simply contain sample files showing the configurations for the maximum set of loggable data. These are not replacements for your existing files, but rather should be merged with them.

In your own configuration, you need only copy out the lines from these files necessary for the specific RCO data you wish to log and add them to your own existing **datalog.idt** and **data_field.idt** files. Remember to make your own table names correspond with those of your control locations.

Datalog.idt

```
|-* IDT file generated by IDTPOP utility v1.0
* RECORD: DATALOG PARAMETERS FOR DATA LOG FILES
*
*   0 FILE_ID              log file name
*   1 SERVICE_ID           Owner service id for the file
*   2 max_rec_size         max size of a record in bytes
*   3 max_recs             max number of records before rollover
*   4 alarm_rec            threshold for alarm generation
*   5 rollover_recs        number of records to keep on rollover
*   6 auto_rollover        TRUE=rollover on number of records logged
*   7 daily_rollover       TRUE=rollover on time_of_day (sync time)
*   8 add_stamp            TRUE=add time stamp to each log entry
*   9 rollover_cmd         DOS cmd to execute on rollover
*  10 timed_rollup         TRUE=rollover on timed basis (periodic)
*  11 archive_id           two character archive id
*  12 compress_arc         TRUE=compress archive file
*  13 batch_pt_id          batch point id associated with log file
*  14 dbms_id              Database in DBMS_DEF file
*  15 table_type           one of A/D/G/X indicating log type
*  16 space_rollover       TRUE if rollover on disk full
*  17 gated_rollover       TRUE if rollover on digital point
*  18 redund_rollover      TRUE if rollover on redundant transition
*  19 rollover_dev         device to check for disk full
*  20 rollover_space       limit (in Kb) for disk full rollover
*  21 gate_point           point to gate rollover
*  22 gate_condition       1=HIGH, 2=LOW, 3=TRANSITION
*  23 rollover_units       5=DAYS, 4=HOURS, 3=MINUTES
*  24 rollover_period      frequency for periodic rollover
*  25 rollover_time        time for synch rollover in min from 00:0
*  26 rollover_export      0=none, 1=all, 2=count, 3=time
*  27 rollover_purge       0=none, 1=all, 2=count, 3=time, 5=exp+al
*  28 rollover_exec        0=none, 1=SQL, 2=DOS, 3=both
*  29 export_file          export target file
*  30 purge_file           purge export target file
*  31 export_format        'C'=CSV
*  32 purge_format         'C'=CSV
*  33 export_range         time/# of records to export
*  34 purge_range          time/# of records not to purge
*  35 sql_command          SQL cmd to execute on rollover
*
SPLIT|DL_RP|368|500|0|100|1|0|1||0|PR|0||$LOGGING|X|0|0|0||0|-
       |0|5|1|0|0|3|0|||C|C|0|86400|
```

Data_field.idt

```
|-* IDT file generated by IDTPOP utility v1.0
* RECORD: DATA_FIELD DLRP Field Definitions
*
*   0 TABLE_ID             DLRP Table Identifier
*   1 field_id             DLRP Field to be logged
*   2 cimp_type            CIMPLICITY Data Type of Field
*   3 field_len            Size of Field, in cimp_type units
*   4 offset               Offset of field in DLAP buffer
*
SPLIT|operation|12|20|0
SPLIT|decision_name|12|41|20
SPLIT|attrib_value|12|21|64
SPLIT|cycle_time|12|22|88
SPLIT|trans_type|7|4|112
SPLIT|user_name|12|33|116
SPLIT|val_override|7|4|152
SPLIT|point_id|12|55|156
SPLIT|data_name|12|17|212
SPLIT|ctrl_loc|12|32|270
SPLIT|state|7|4|304
SPLIT|trigger_src|12|17|308
SPLIT|trigger_seq|12|17|327
SPLIT|trigger_type|7|4|348
SPLIT|old_status|7|4|352
SPLIT|new_status|7|4|356
```

Function Blocks Overview

About RCO Function Blocks

Function blocks are the basic unit of execution in Routing Control Logic and output scripts. A function block may be used in any type of script; however, some blocks have a specific purpose that limits their usefulness in certain types of modules. For example, a *Select Decision* function block in an output module would serve no purpose. The decision has already been selected by the time the output module is selected. A *Set Point* function block could be useful in either a logic or output module.

Routing Logic Modules (RLM) are used to select decisions. The list of available decisions is controlled by Routing Control Configuration. A logic module can only select or eliminate a decision in one specific site, it may not select or eliminate decisions in more then one site.

RCO supports the following types of function blocks:

- Routing function blocks
- Core function blocks
- Output function blocks
- Conditional function blocks
- Diagnostic function blocks
- PRT function blocks

Routing Function Blocks

Balance Load

Description

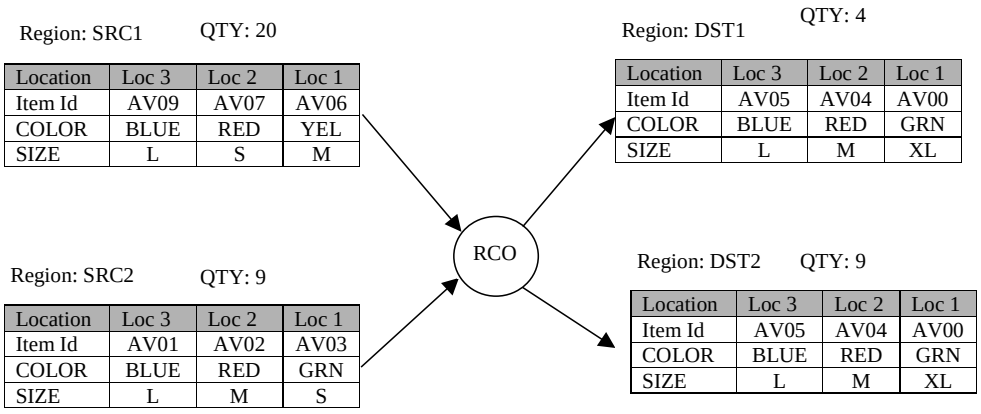
`Balance Load` allows a cost to be assigned to a decision. The cost takes into consideration the number of items in the source and destination regions, as well as the region with the most number of items. A threshold is then specified that the cost cannot exceed.

Parameters

This function block has the following parameters:

Parameter	Description
Always Evaluate	Hard, Soft or Breakable. This parameter controls what happens when the extension eliminates all available decisions. Hard: All decisions will remain eliminated. Enter a wait state after the logic script has completed. Soft: Roll back any decisions eliminated by this extension. Breakable: Roll back any decisions eliminated by this extension that have a danger point value of TRUE (non zero). The routing modules will first use the danger defined for each individual decision; and, if no danger point has been configured for the decision, then the site-wide danger point will be used. If no danger point can be found for a decision, then the decision remains eliminated.
Threshold Value	Specifies the threshold value to be used in balancing the load.

Example

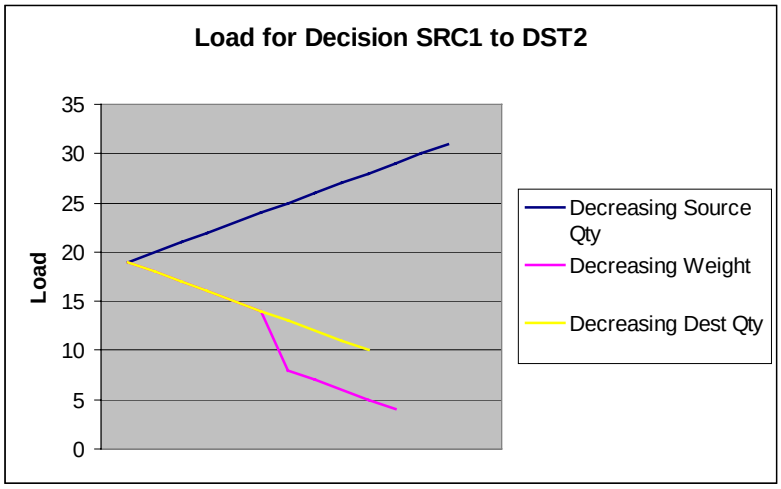

Region: SRC1
QTY: 20
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV09 | AV07 | AV06
COLOR | BLUE | RED | YEL
SIZE | L | S | M
Region: SRC2
QTY: 9
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV01 | AV02 | AV03
COLOR | BLUE | RED | GRN
SIZE | L | M | S
RCO
Region: DST1
QTY: 4
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV05 | AV04 | AV00
COLOR | BLUE | RED | GRN
SIZE | L | M | XL
Region: DST2
QTY: 9
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV05 | AV04 | AV00
COLOR | BLUE | RED | GRN
SIZE | L | M | XL

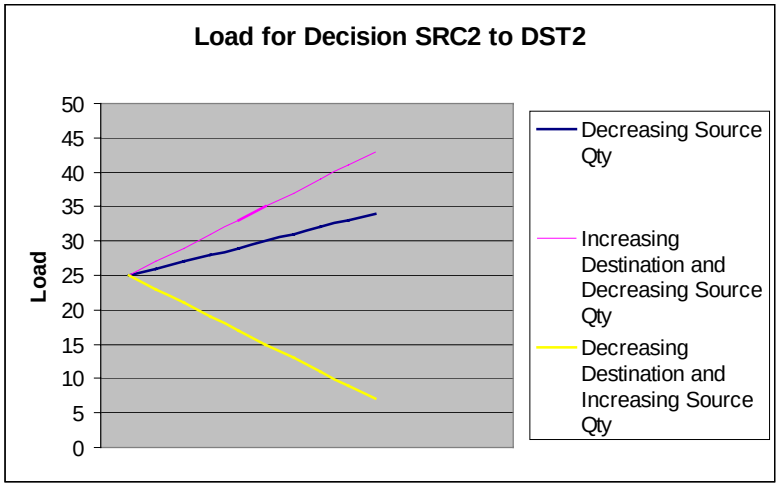
Decision	Weight	Source Qty	Destination Qty	Formula	Load
SRC1 to DST1	15	20	4	(15 – 20) + 15 + 4	14
SRC1 to DST2	15	20	9	(15 – 20) + 15 + 9	19
SRC2 to DST1	5	9	4	(15 – 9) + 5 + 4	15
SRC2 to DST2	10	9	9	(15 – 9) + 10 + 9	25

Max Source region cost of all available source regions is 15.

User Specified Threshold is 16.

1. Decision SRC1 to DST1, Load is 14, Decision is *not* eliminated because it does not exceed Threshold.
2. Decision SRC1 to DST2, Load is 19, Decision is eliminated because it does exceed Threshold.
3. Decision SRC2 to DST1, Load is 15, Decision is *not* eliminated because it does not exceed Threshold.
4. Decision SRC1 to DST1, Load is 14, Decision is eliminated because it does exceed Threshold





Pseudo Code

```
For each decision
  If decision is not eliminated
    Get value of source region's quantity point from region maintenance table
    If (number of items in source region is greater than 0)
      Get the value of destination region quantity point from region maintenance
      If the number of items in destination region is greater than 0
        Calculate maximum source cost as follows
          Set nMaxSrcCost to the number of items in source region of decision #0
          For each decision from 1 to last
            If (Number of items in current region > nMaxSrcCost)
               Set nMaxSrcCost to number of items in region
            End If
          Next decision
        Set nWeight to current decision weight
        Calculate the load as follows:
          Load = (nMaxSrcCost - # of items in source region)
                + Current Decision weight
                + number of items in destination region
      End if // number of items in destination region > 0
    End if // number of items in source region > 0
    If (Load is >= specified Threshold Value)
        Eliminate the decision
    End if
  End if
Next For
```

Block by Attribute

Description

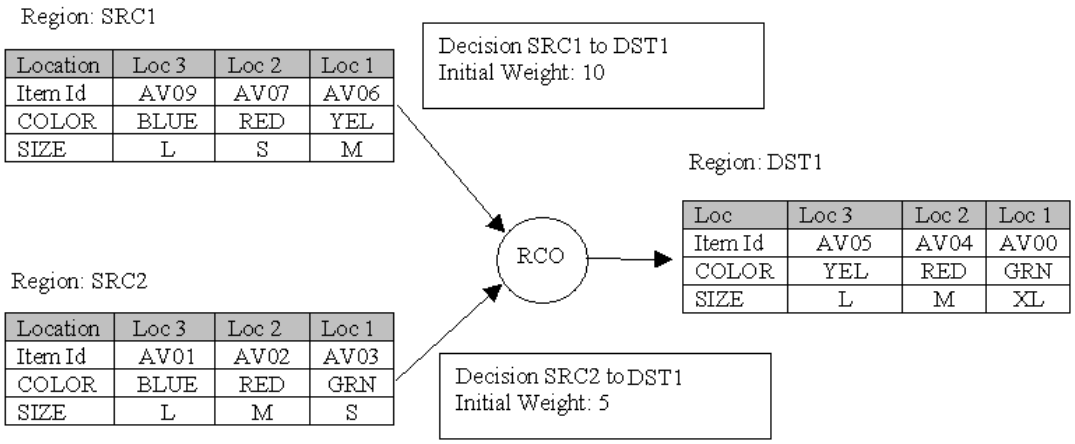
Block by Attribute eliminates each decision where the item at the specified source region location does not match the item at the destination region tail location.

Parameters

This function block has the following parameters:

Parameter	Description
Always Evaluate	Hard, Soft or Breakable. This parameter controls what happens when the extension eliminates all available decisions. Hard: All decisions will remain eliminated. Enter a wait state after the logic script has completed. Soft: Roll back any decisions eliminated by this extension. Breakable; Roll back any decisions eliminated by this extension that have a danger point value of True (non zero). The routing modules will first use the danger defined for each individual decision; and, if no danger point has been configured for the decision, then the site-wide danger point will be used. If no danger point can be found for a decision, then the decision remains eliminated.
Item Class	All items with matching class will be used.
Location	Number of locations in source regions to scan.
Attribute ID	Name of Attribute to compare.
Start Character	Starting character of the attribute to be used.
Attribute Length	Specifies the number of characters in the attribute to compare.
End Character	Ending character of the attribute to be used. Enter zero in both the Start Character and Attribute Length fields to use all characters.

Example


Region: SRC1
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV09 | AV07 | AV06
COLOR | BLUE | RED | YEL
SIZE | L | S | M
Decision SRC1 to DST1
Initial Weight: 10
Region: DST1
Loc | Loc 3 | Loc 2 | Loc 1
Item Id | AV05 | AV04 | AV00
COLOR | YEL | RED | GRN
SIZE | L | M | XL
RCO
Region: SRC2
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV01 | AV02 | AV03
COLOR | BLUE | RED | GRN
SIZE | L | M | S
Decision SRC2 to DST1
Initial Weight: 5

Parameter Name	Parameter Value
Always Evaluate	Hard
Item Class	VEHICLE
Location	1
Attribute ID	COLOR
Start Character	0
Attribute Length	0

1. For decision SRC1 to DST1, the source region attribute value is YEL and the destination attribute value is YEL. The attributes match so the decision is not eliminated.
2. For Decision SRC2 to DST1, the source region attribute value is GRN and the destination attribute value is YEL. The attributes do not match so the decision is eliminated.

Pseudo Code

```
For each decision
  Get Item at specified source region location
  If there are items in the source region
    Get item at tail destination region location
    If there are items in the destination region
      If the attribute values do not match
        Eliminate the decision
      End if
      Else
        Eliminate the decision because there are no
        Items in the destination region
      End if
    Else
      Eliminate the decision because there are no items
      In the source location
    End if
  Next
```

Note: If no items of the specified class are contained in the source region or in the destination region, then the decision is eliminated.

Check Item Hold Status

Description

Check Item Hold Status operates differently depending on the number of destination regions.

If there is only one destination region, **Check Item Hold Status** eliminates any decisions where the items at the source region specified locations are on Internal or External Hold.

If there are 2+ destination regions, **Check Item Hold Status** eliminates any decision where the source item is on hold and the destination region is on hold or where the source item is on hold and the destination region is not on hold.

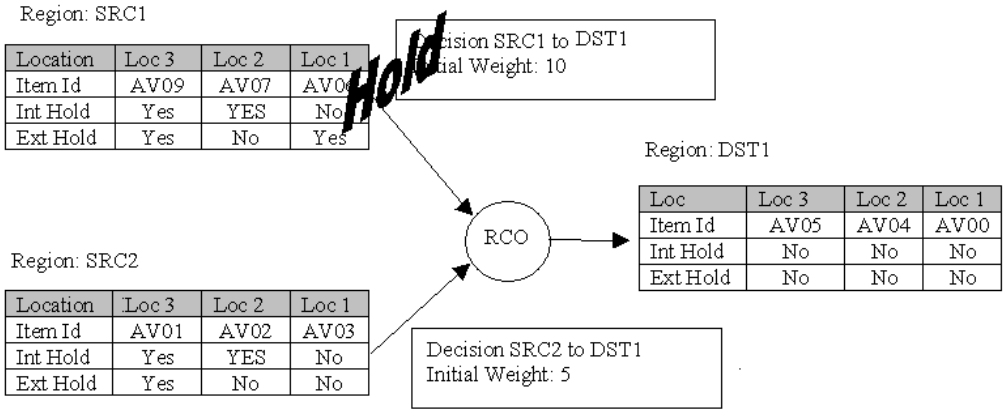
Parameters

This function block has the following parameters:

Parameter	Description
Always Evaluate	Hard, Soft or Breakable. This parameter controls what happens when the extension eliminates all available decisions. Hard: All decisions will remain eliminated. Enter a wait state after the logic script has completed. Soft: Roll back any decisions eliminated by this extension. Breakable: Roll back any decisions eliminated by this extension that have a danger point value of TRUE (non zero). The routing modules will first use the danger defined for each individual decision; and, if no danger point has been configured for the decision, then the site-wide danger point will be used. If no danger point can be found for a decision, then the decision remains eliminated.
Item Class	All items with matching class will be used.

Example

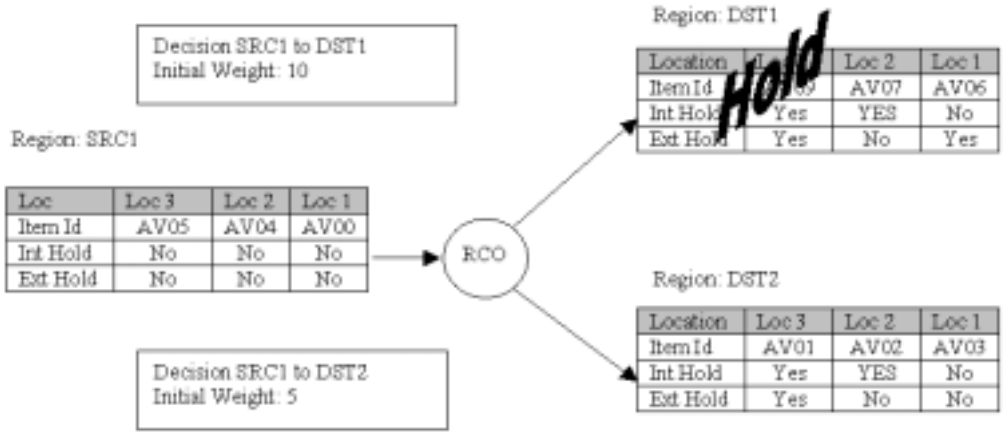
Merge Example

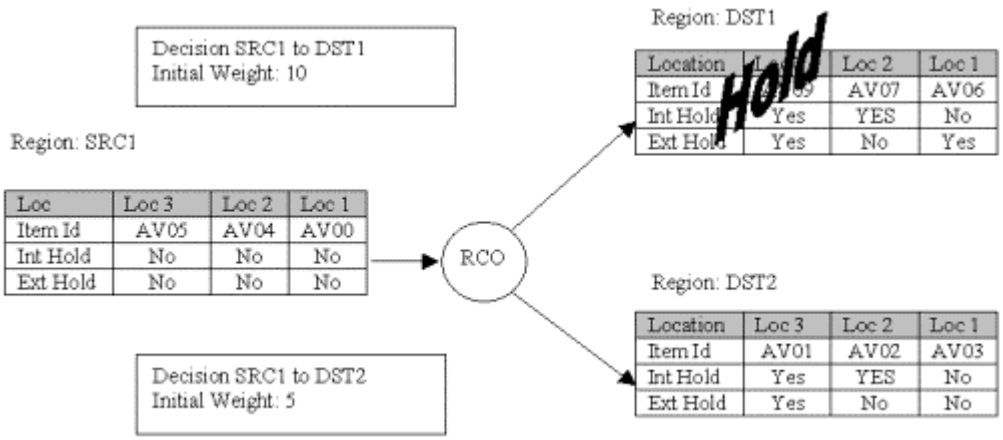

Region: SRC1
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV09 | AV07 | AV06
Int Hold | Yes | YES | No
Ext Hold | Yes | No | Yes
Hold
Decision SRC1 to DST1
Initial Weight: 10
Region: DST1
Loc | Loc 3 | Loc 2 | Loc 1
Item Id | AV05 | AV04 | AV00
Int Hold | No | No | No
Ext Hold | No | No | No
RCO
Region: SRC2
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV01 | AV02 | AV03
Int Hold | Yes | YES | No
Ext Hold | Yes | No | No
Decision SRC2 to DST1
Initial Weight: 5

Parameter Name	Parameter Value
Always Evaluate	**HARD**
Item Class	**VEHICLE**

1. For decision SRC1 to DST1, the item is on External hold, so the decision is eliminated.
2. For decision SRC2 to DST2, the item is not on External or Internal Hold, so the decision is not eliminated.

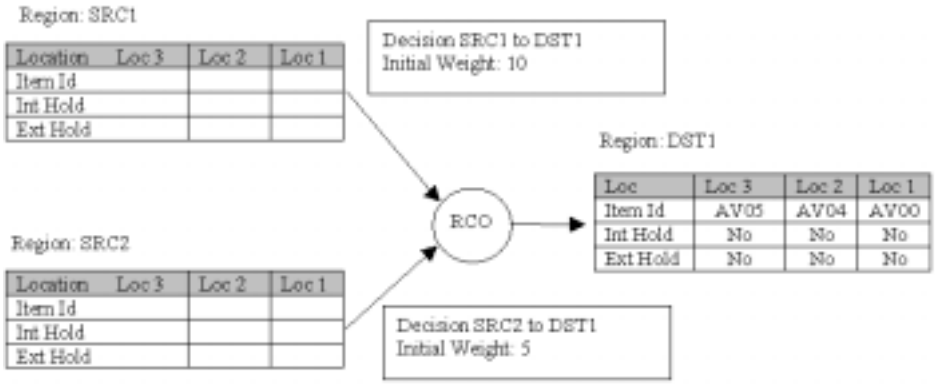
Split Example


Decision SRC1 to DST1
Initial Weight: 10
Region: SRC1
Loc | Loc 3 | Loc 2 | Loc 1
Item Id | AV05 | AV04 | AV00
Int Hold | No | No | No
Ext Hold | No | No | No
RCO
Region: DST1
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV09 | AV07 | AV06
Int Hold | Yes | YES | No
Ext Hold | Yes | No | Yes
Hold
Region: DST2
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV01 | AV02 | AV03
Int Hold | Yes | YES | No
Ext Hold | Yes | No | No
Decision SRC1 to DST2
Initial Weight: 5



1. For decision SRC1 to DST1, the item is not on External or Internal Hold but the destination region is on hold, so the decision is eliminated.
2. For decision SRC1 to DST2, the item is not on External or Internal hold and the destination region is also not on hold, so the decision is **not** eliminated.

Blank Example



Since all source regions have no items matching the specified item class. All decisions are eliminated.

Pseudo Code

```
If single destination region
  For each decision
    Get items at specified location/item class from decision source region
    If there are items at the region and location
      For each item at location
        If current item is on internal or external hold
          Eliminate the decision
          Next decision
        End if
      Next for
    End if
  Next decision
Else
  // multiple destination regions
  For each decision
    Get items from specified location/item class from decision source region
    If there are items at the region and location
      For each item at location
        If current item is on internal or external hold
          Set source hold flag
        End if
      Next
      Get the region status point from the region's "Region Maintenance record"
    If the point value indicates the region is on hold
      Set the region hold flag
    End if
    If (the source hold flag is NOT set and the region hold flag is set) or
      (the source hold flag is set and region hold flag is not set)
      Eliminate the decision
    End If
Next decision
If there were no items found in any of the source regions
  Eliminate all decisions
End if
```

Note: In single or multiple destination mode, if no items matching the specified item class were found in the specified location of any decision source regions, then all decisions are eliminated.

Check Process Capability

Description

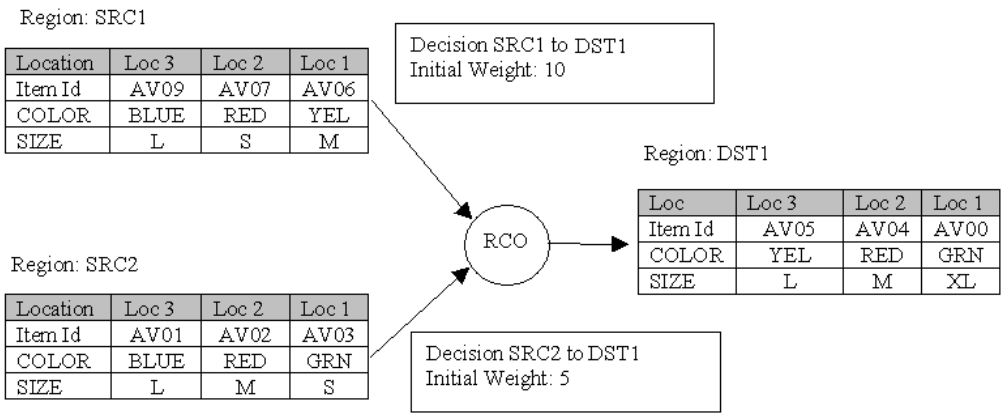
`Check Process Capability` eliminates decisions based on the comparison of the destination region's attributes and the region's Capability Point Value.

Parameters

This function block has the following parameters:

Parameter	Description
Always Evaluate	Hard, Soft or Breakable. This parameter controls what happens when the extension eliminates all available decisions. Hard: All decisions will remain eliminated. Enter a wait state after the logic script has completed. Soft: Roll back any decisions eliminated by this extension. Breakable: Roll back any decisions eliminated by this extension that have a danger point value of TRUE (non zero). The routing modules will first use the danger defined for each individual decision; and, if no danger point has been configured for the decision, then the site-wide danger point will be used. If no danger point can be found for a decision, then the decision remains eliminated.
Item Class	All items with matching class will be used.
Attribute ID	Name of Attribute to compare.
Start Character	Starting character of the attribute to be used.
Attribute Length	Specifies the number of characters in the attribute to compare.
End Character	Ending character of the attribute to be used. Enter zero in both the Start Character and Attribute Length fields to use all characters.
Capability Point Number	The capability point to be used. There are three potential capability points, only one may be specified.
Check	Select either the decision's destination or source region.

Example


Region: SRC1
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV09 | AV07 | AV06
COLOR | BLUE | RED | YEL
SIZE | L | S | M
Decision SRC1 to DST1
Initial Weight: 10
Region: DST1
Loc | Loc 3 | Loc 2 | Loc 1
Item Id | AV05 | AV04 | AV00
COLOR | YEL | RED | GRN
SIZE | L | M | XL
RCO
Region: SRC2
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV01 | AV02 | AV03
COLOR | BLUE | RED | GRN
SIZE | L | M | S
Decision SRC2 to DST1
Initial Weight: 5

Parameter Name	**Parameter Value**
Always Evaluate Flag	HARD
Item Class	VEHICLE
Location	1
Attribute ID	COLOR
Start Character	0
Attribute Length	0
Capability Point Number	2
Decision Region	

Capability Point 2 Values

YEL

RED

BLUE

1. For decision SRC1 to DST1, the color attribute has a value of “YEL,” and “YEL” is found in the first element of the capability point, so the decision is not eliminated.
2. For decision SRC2 to DST1, the color attribute has a value of “GRN," but “GRN” is not found in the capability point, so the decision is eliminated.

Pseudo Code

```
For each decision
  Get items of specified class at specified location
  If items were found
    Get capability point for destination region
    If point is an array
      For each element of the array
        If the attribute value and the current array element value match
          Next decision
        End if
      Next element
      If no matches found between point values and attribute value
        Eliminate the decision
      End if
    Else
      If the point value and the attribute do NOT match
        Eliminate the decision
      End if
    End if
  Else
    \\ no items found at specified location
    Eliminate the decision
  End if
Next decision
```

Guidelines

- Comparison is case insensitive.
- The Capability point must be of type string.
- If the Capability point is an array of strings, then each element will be scanned for the attribute.
- If no items of the specified class are found at the source region, all decisions are eliminated.

Check Region Full

Description

`Check Region Full` eliminates each decision where routing an item to the destination region would cause the region to exceed the maximum number of items configured in the Region Maintenance Table.

Parameters

This function block has the following parameter:

Parameter	Description
Always Evaluate	Hard, Soft or Breakable. This parameter controls what happens when the extension eliminates all available decisions. Hard: All decisions will remain eliminated. Enter a wait state after the logic script has completed. Soft: Roll back any decisions eliminated by this extension. Breakable: Roll back any decisions eliminated by this extension that have a danger point value of TRUE (non zero). The routing modules will first use the danger defined for each individual decision; and, if no danger point has been configured for the decision, then the site-wide danger point will be used. If no danger point can be found for a decision, then the decision remains eliminated.

Example

1. Decision SRC1 to DST2, destination region has a quantity of 2. Routing an item to this region would not exceed the maximum. This decision is ***not*** eliminated.
2. Decision SRC1 to DST2, the destination region has a quantity of 3. Routing to this location would cause the item count to exceed the maximum count configured in Region Maintenance. This decision is eliminated.

Pseudo Code

```
For each decisions
  If the decision is still possible
    If the decision source region has a Quantity point in Region Maintenance
      Get the value of the quantity point
      Get the region capacity
      If the current region capacity + 1 > the configured capacity
        Eliminate the decision
      End if
    End if
  End if
Next decision
```

Check Region Ready

Description

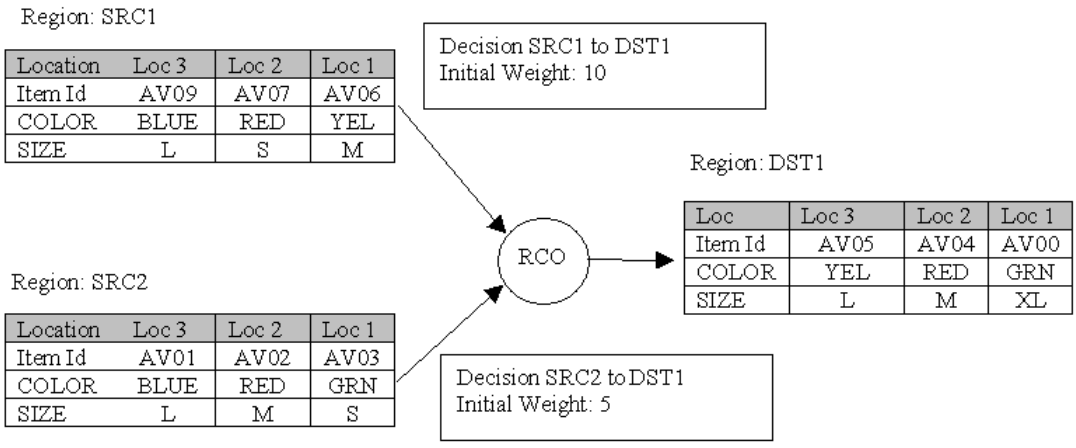
`Check Region Ready` eliminates a decision based on the value of the region status point or the region enable point for both the source and destination region. If the binary '*and'* of the value of the region status point and the region Ready Mask for either source or destination regions is 0, then the decision is eliminated. If the value of the source or destination region's enable point is zero, then the decision is eliminated. If any of the points are configured, but are unavailable, the decision is eliminated.

Parameters

This function block has the following parameter:

Parameter	Description
Always Evaluate	Hard, Soft or Breakable. This parameter controls what happens when the extension eliminates all available decisions. Hard: All decisions will remain eliminated. Enter a wait state after the logic script has completed. Soft: Roll back any decisions eliminated by this extension. Breakable: Roll back any decisions eliminated by this extension that have a danger point value of TRUE (non zero). The routing modules will first use the danger defined for each individual decision; and, if no danger point has been configured for the decision, then the site-wide danger point will be used. If no danger point can be found for a decision, then the decision remains eliminated.

Example


Region: SRC1
Location Loc 3 Loc 2 Loc 1
Item Id AV09 AV07 AV06
COLOR BLUE RED YEL
SIZE L S M
Decision SRC1 to DST1
Initial Weight: 10
Region: DST1
Loc Loc 3 Loc 2 Loc 1
Item Id AV05 AV04 AV00
COLOR YEL RED GRN
SIZE L M XL
RCO
Region: SRC2
Location Loc 3 Loc 2 Loc 1
Item Id AV01 AV02 AV03
COLOR BLUE RED GRN
SIZE L M S
Decision SRC2 to DST1
Initial Weight: 5

Region Maintenance Table

Region ID	Region Ready Mask	Region Status Point	Enable Point
SRC1	2	SRC1_STATUS	SRC1_ENABLE
SRC2	2	SRC2_STATUS	SRC2_ENABLE
DST1	2	DST1_STATUS	DST1_ENABLE

Values of various points.

Point ID	Value
SRC1_STATUS	2
SRC2_STATUS	2
DST1_STATUS	2
SRC1_ENABLE	0
SRC2_ENABLE	1
DST1_ENABLE	1

For decision SRC1 to DST1:

1. Value of Ready Mask for the source region is 2.
2. Value of region ready point for the source region is 2.
3. Binary and of Ready Mask and status point is 1. The source region is “Ready," so the decision is not eliminated.
4. Value of Ready Mask for the destination region is 2.
5. Value of region ready point for the destination region is 2.
6. Binary and of Ready Mask and status point is 1.The destination region is “Ready," so the decision is not eliminated.
7. The of the source region enable point is 0. The source region is disabled, eliminate the decision.

For decision SRC2 to DST1:

1. Value of Ready Mask for the source region is 2.
2. Value of region ready point for the source region is 2.
3. Binary and of Ready Mask and status point is 1. The source region is “Ready," so the decision is not eliminated.
4. Value of Ready Mask for the destination region is 2.
5. Value of region ready point for the destination region is 2.
6. Binary and of Ready Mask and status point is 1. The destination region is “Ready," so the decision is not eliminated.
7. The of the source region enable point is 1. The source region is enabled, so the decision is *not* eliminated.
8. The of the destination region enable point is 1. The destination region is enabled, so the decision is *not* eliminated.

Pseudo Code

```
For each decision that is not yet eliminated
  Get region Ready Mask for decision destination region
  Get status point for decision destination region
  Set value_to_check to value of regions status point
  If region status point is unavailable than
    Eliminate the decision
  End if
  If binary ‘and’ of value_to_check and region Ready Mask is 0
    Eliminate the decision
  End if
  Get decision destination region “enable point," from region maintenance table
  Get value of destination region “enable point”
  If (enable point is unavailable)
    Eliminate the decision
  End if
If value of the enable point is 0
  Eliminate the decision
End if
Get decision source region’s, Ready Mask from region maintenance table
Get decision source region’s, status point from region maintenance table
Set value_to_check to value of source region, region status point
If point is unavailable
  Eliminate the decision
End if
If binary ‘and’ of value_to_check and region Ready Mask is 0
  Eliminate the decision
End if
Get decision source region, region enable point from region maintenance table
Get value of source region, region enable point
If point is unavailable
  Eliminate the decision
End if
If value of region enable point is 0
  Eliminate the decision
End if
```

Note: All points from the region maintenance table are added to the Routing Control Object’s point cache at startup.

Consume a Trigger

Description

Unexpected Point Processing must be enabled for **`Consume a Trigger`** to work. The next trigger received for the site will be passed through unexpected point process and will be buffered. If a 2nd + trigger is received, then that trigger is unexpected and the site is disabled.

After the site completes the current cycle the buffer trigger will be processed.

Parameters

This function block has the following parameter:

Parameter	Description
Trigger Name	Name of trigger to consume or blank to consume next trigger.

Example

Not available for this release.

Pseudo Code

Not available for this release.

Return Value

None.

Eliminate by Weight

Description

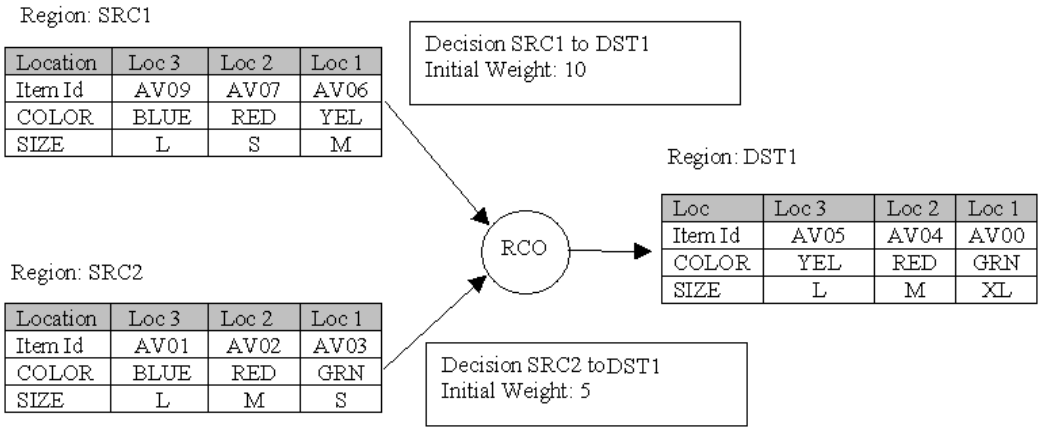
`Eliminate by Weight` eliminates all decisions whose current weight is less then the specified value.

Parameters

This function block has the following parameter:

Parameter	Description
Threshold	All decisions whose weight is less then this value are eliminated.

Example


Region: SRC1
Location Loc 3 Loc 2 Loc 1
Item Id AV09 AV07 AV06
COLOR BLUE RED YEL
SIZE L S M
Decision SRC1 to DST1
Initial Weight: 10
Region: DST1
Loc Loc 3 Loc 2 Loc 1
Item Id AV05 AV04 AV00
COLOR YEL RED GRN
SIZE L M XL
RCO
Region: SRC2
Location Loc 3 Loc 2 Loc 1
Item Id AV01 AV02 AV03
COLOR BLUE RED GRN
SIZE L M S
Decision SRC2 toDST1
Initial Weight: 5

Parameter Name	Parameter Value
Threshold	15

1. For decision SRC1 to DST1, the current weight is 10, the threshold is 15, so the decision is eliminated.
2. For decision SRC2 to DST2, the current weight is 5, the threshold is 15, so the decision is eliminated.

Pseudo Code

```
For each decision
  If the decision weight is less than the specified threshold
    Eliminate the decision
  End If
Next decision
```

Eliminate Decision Based on Attribute Spacing

Description

`Eliminate Decision Based on Attribute Spacing` eliminates a decision using spacing by attribute counts.

Modifications

This function block has an additional parameter, an array point ID that lists the item class for each attribute. Only items that belong to the specified item class will be considered.

Once the count exceeds the rule, the count is reset.

Parameters

This function block has the following parameters:

Parameter	Description
Item Class	Name of array point that lists item class of the item that contains the attribute. Specify the class of the items to be considered or leave blank for all items.
Attribute Name	Name of the array point that lists the attribute names to be compared. Compare value(s) of the corresponding element in the attribute value array point to the attribute value of the head item for each of the source regions.
Attribute Value	Name of the array point that contains the Attribute value(s). Each element can contain one or multiple values with a comma separator. Do not include quotes. For example: element 0 = `1 ton,3/4 ton` element 1 = **`K`**
Spacing Rule	The number of jobs that must be spaced between jobs with the corresponding attribute value(s).
Spacing Count	The number of jobs released since a job with the corresponding attribute value was released.
Spacing Breakability	If breakable (element = 1) and all sources are eliminated, roll back the decisions eliminated during the comparison by one set of related elements.

Example

Initial Point Values

Offset	Item Class	Attribute Name	Attribute Value	Spacing Rule	Spacing Count	Spacing Breakability
0	VEHICLE	COLOR	YEL,GRN	2	2	0
1	VEHICLE	SIZE	S	3	0	1
2	VEHICLE	COLOR	BLACK	3	0	0

Site is triggered and logic module with a single function block, Eliminate Decision Based On Attribute Spacing, is executed.

Array Offset 0

SRC1.

Head item with class of Vehicle, has a COLOR attribute with value of YEL. The possible attribute values are YEL or GRN. There is a match, so the spacing count is compared to the spacing rule. Since the spacing count is not less than spacing rule, the decision is not eliminated.

SRC2.

Head item with class of Vehicle, has a COLOR attribute with value of GRN. The possible attribute values are YEL or GRN. There is a match, so the spacing count is compared to the spacing rule. Since the spacing count is not less than the spacing rule, the decision is not eliminated.

There are still decisions possible so the breakability flag is not checked.

Array Offset 1

SRC1.

Head item with class of Vehicle, has a SIZE attribute with value of S. The possible attribute value is S. There is a match, so the spacing count is compared to the spacing rule. Since the spacing count is less than the spacing rule, the decision is eliminated.

SRC2.

Head item with class of Vehicle, has a SIZE attribute with value of S. The possible attribute value is S. There is a match, so the spacing count is compared to the spacing rule. Since the spacing count is less than the spacing rule, the decision is eliminated.

There are no decisions possible, so the breakability flag is checked. The flag is set to 1.

Array Offset 2

SRC1.

Head item with class of Vehicle, has a COLOR attribute with value of YEL. The possible attribute value is BLACK. There is no match, so no further processing takes place.

SRC2.

Head item with class of Vehicle, has a COLOR attribute with value of GRN. The possible attribute value is BLACK. There is no match, so no further processing takes place.

Pseudo Code

```
For each array element
  Get attribute name
  Get attribute value
  Get breakable flag
  If attribute name and value are not blank
    For each still possible decision
      Get the items at the decisions head location
      If (number of items at head > 0)
        For each item in head location
          Get the attribute value
           If the attribute was found
            If the attribute values match
              If the spacing count is greater than spacing rule
                Eliminate the decision
                If the breakable flag is not set
                  If (all decisions have been eliminated)
                    Alarm
                  End if
                End if
              End if
            End if
        Next item at head location
    Next valid decision
    If all decisions have been eliminated and breakable flag is set
      Rollback any decisions eliminated by this array offset
    End if
Next element
```

Eliminate Decision Based on Rule

Description

`Eliminate Decision Based on Rule` eliminates decisions based on attribute Grouping and Spacing Rules. This block can be configured to eliminate by either rule and treats both rules with the same priority.

The Spacing rule uses the same logic as the function block, *Eliminate Decision Based On Attribute Spacing*. The spacing rule breaks up items with matching attributes. For example, you do not want two items with a color attribute of "BLUE" to be routed one after another. The Spacing rule would eliminate the decision that would send the second Blue item.

The grouping rule breaks up blocks of items with a specified attribute. For example you do not want to send the color combination "Blue,Red,Blue," more then twice. The Grouping rule would tend to eliminate decisions that would result in this block.

The percentage rule, eliminates a decision if the percentage of attributes released falls outside of a specified range.

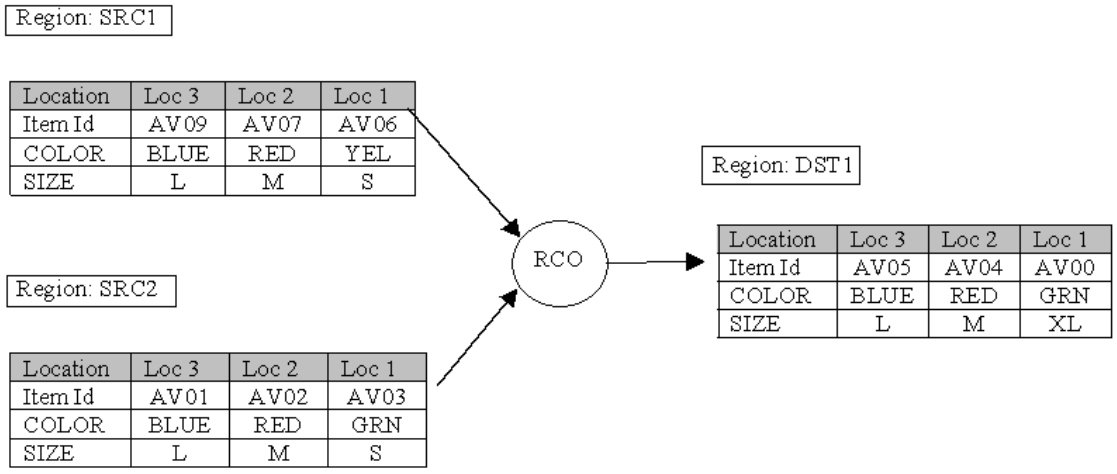
Parameters

This function block has the following parameters:

Parameter	Description
Always Evaluate	Hard, Soft or Breakable. This parameter controls what happens when the extension eliminates all available decisions. Hard: All decisions will remain eliminated. Enter a wait state after the logic script has completed. Soft: Roll back any decisions eliminated by this extension. Breakable: Roll back any decisions eliminated by this extension that have a danger point value of TRUE (non zero). The routing modules will first use the danger defined for each individual decision and, if no danger point has been configured for the decision, then the site-wide danger point will be used. If no danger point can be found for a decision, then the decision remain eliminated.
Item Class	Class of the item that contains the attribute. Blank will specify all items at the region.
Rule Type	Type of elimination to be performed. G: Grouping. Eliminate if the count exceeds or equals the Rule. S: Spacing. Eliminate if the count is less then the rule. P: Percentage rule.
Attribute Name	Name of the array point that lists the attribute names to be compared. Compare value(s) of the corresponding element in the attribute value array

	point to the attribute value of the head item for each of the source regions.
Attribute Value	Name of array points that lists the Attribute value(s). Each element can contain one or multiple values with a comma separator. Do not include quotes. For example: Element 0 = **`1 ton,3/4 ton`** Element 1 = **`K`**
Rule	The number of jobs. (Grouping and Spacing Rules)
Count	The number of jobs released. (Grouping and Spacing Rules)
Upper Release % Target	The upper percentage limit, of an acceptable range, for vehicles that ***should be*** released from the bank with the corresponding attribute value. (Percentage Rule Only)
Lower Release % Target	The lower percentage limit, of an acceptable range, for vehicles that ***should be*** released from the bank with the corresponding attribute value. (Percentage Rule Only)
Attribute Released Count	The actual number of vehicles released from the bank with the corresponding attribute value. (Percentage Rule Only)
Total Released Count	A counter point containing the total number of jobs released from the bank (Percentage Rule)
Spacing Breakability	Name of the array point. If breakable (element = 1) and all sources are eliminated, roll back the decisions eliminated during the comparison by one set of related elements.

Example


Region: SRC1
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV09 | AV07 | AV06
COLOR | BLUE | RED | YEL
SIZE | L | M | S
Region: SRC2
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV01 | AV02 | AV03
COLOR | BLUE | RED | GRN
SIZE | L | M | S
RCO
Region: DST1
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV05 | AV04 | AV00
COLOR | BLUE | RED | GRN
SIZE | L | M | XL

Initial Point Values

Offset	Rule Type	Item Class	Attribute Name	Attribute Value	Rule	Count	Breakability
0	G	VEHICLE	COLOR	YEL,GRN	2	2	0
1	S	VEHICLE	SIZE	S	3	0	1
2	P	VEHICLE	COLOR	GRN	3	0	0

Site is triggered and logic module with a single function block, *Eliminate Decision Based On Rules*, is executed.

`Array Offset 0`

The rule defined in offset one is a grouping rule.

`SRC1.`

Head item with class of Vehicle, has a COLOR attribute with value of YEL. The possible attribute values are YEL or GRN. There is a match, so the Count is compared to the Rule. Since the Count is greater then or equal to the Rule, the decision is eliminated.

`SRC2.`

Head item with class of Vehicle, has a COLOR attribute with value of GRN. The possible attribute values are YEL or GRN. There is a match, so the Count is compared to the Rule. Since the Count is greater then or equal to the Rule, the decision is eliminated.

Array Offset 1

The Rule defined in offset one is a Spacing rule.

SRC1.

Head item with class of Vehicle, has a SIZE attribute with value of S. The possible attribute value is S. There is a match, so the Count is compared to the Rule. Since the Count is less than the Rule, the decision is eliminated.

SRC2.

Head item with class of Vehicle, has a SIZE attribute with value of S. The possible attribute value is 'S'. There is a match, so the count is compared to the rule. Since the count is less than the rule, the decision is eliminated.

There are no decisions possible, so the breakability flag is checked. The flag is set to 1, we will roll back any decisions eliminated in this pass.

Array Offset 2

Initial Point Values

Offset	Rule Type	Item Class	Attribute Name	Attribute Value	Upper Rel %	Lower Rel %	Attrib Count	Total Count	Breakability
0	G	VEHICLE	COLOR	YEL,GRN					0
1	S	VEHICLE	SIZE	S					1
2	P	VEHICLE	COLOR	BLACK	75	50	6	10	0

The Rule defined in offset one is a Percentage rule.

SRC1.

Head item with class of Vehicle, has a COLOR attribute with value of YEL. The possible attribute value is GRN. We don't have a match, so no further processing takes place.

SRC2.

Head item with class of Vehicle, has a COLOR attribute with value of GRN. The possible attribute value is GRN. The total of items released with this attribute is 6, with a total release count of 10, so 60% of the items have had a color attribute of GRN. Since 60% is less then 75 and greater then 50, the decision is not eliminated.

Pseudo Code

```
          For each array element
         { \\ start for each element in array element
     Get attribute name,  Get attribute value,  Get breakable flag , Get Item
       Class
If attribute name and value are not blank
   { \\ start if attribute name and value are not blank.
      For each still possible decision
       { \\ start for  each decision whose eliminate flag is not set
           Get the items at the decisions head location
           If (number of items at head > 0)
            { \\ start if items > 0
               For each item in head location
             { \\ start for each item in location
                     Get the attribute value
                     If (the attribute was found and  the attribute values match)
                        { \\ start if attribute found and value matched)
       Set eliminate flag to false
       if Rule type[P3] == Group
                  if  Group count[P7] is >=  rule [P6]
```

```
                    set eliminate flag to true
                end if
       Else if Rule type[P3] == Percentage
                Calculate the percentage released =
                Attribute Count[P10] / Total count [P11]* 100
                If (Percent Release is >= Upper Rel %[P8] or
                    Percent Release is <= Lower Rel[P9] %)
                    Set the eliminate flag.
                End if
       Else \\ if rule type is spacing
                If (spacing count[P7] < rule [P6])
                    Set eliminate flag to true
                End if
                        }//endif attribute found and match
                 }//end for next item at location
              }\\end if item > 0
}\\end for each possible decision

if(breakability flag [P12]is set)
{ \\ start if breakability flag set
  if (all decisions are eliminated)
     {
         Roll back decisions eliminated by this  pass of array element (rule type)
        ( i.e. do not eliminate decisions whose eliminate flag is set on this
       pass)
      }
  else \\ if all decisions are not eliminated and breakability flag is set
     {
          Eliminate decisions whose eliminate flag is set in this pass
      }
}\\ end if breakability flag set
else \\ if breakability flag is not set for this pass
{
     Eliminate decisions whose eliminate flag is set in this pass
}
                    }//endiif attribute value and name are blank
             }//end for – next array element
```

Eliminate Decisions Based on Region Status

Description

Eliminate Decisions Based on Region Status eliminates a decision based region status data of the source and destination region id for each decision.

INPUT

The input for this function block is a list of TRUE/FALSE combo boxes. In all cases select TRUE for the criteria to be selected.

1. If TRUE, eliminates decisions whose source region's head item is not validated.
2. If TRUE< eliminates decisions whose source region has a decision.
3. If TRUE, eliminates decisions whose source region is out-locked or destination region is in-locked.
4. If TRUE, eliminates decisions whose destination region is full.

OUTPUT

Decisions that meet the criteria are eliminated.

Pseudo Code

```
For each decision in the decision list.
    Get data on source region

   If (first parameter is true and head item not valid then
           Eliminate the decision.
   Else if (second parameter is true and region is waiting on a decision then
           Eliminate Decision
   Else if (third parameter is true and source region is out0locked then
     Eliminate Decision
   End if
Next

For each decision in the decision list.
    Get data on destination region
   If (third parameter is true and the destination region is in-locked then
     Eliminate Decision

   Else if (fourth parameter is true And the destination region is full
     Eliminate Decision
   End if
Next
```

Eliminate Decision by Attribute

Eliminate Decision by Attribute is obsolete. Use the current function blocks:

- Eliminate Decision by Attribute Attribute,
- Eliminate Decision by Attribute Point and
- Eliminate Decision by Attribute Value.

Eliminate Decision by Attribute Attribute

Description

Eliminate Decision by Attribute Attribute eliminates a decision based on the comparison of two attribute values.

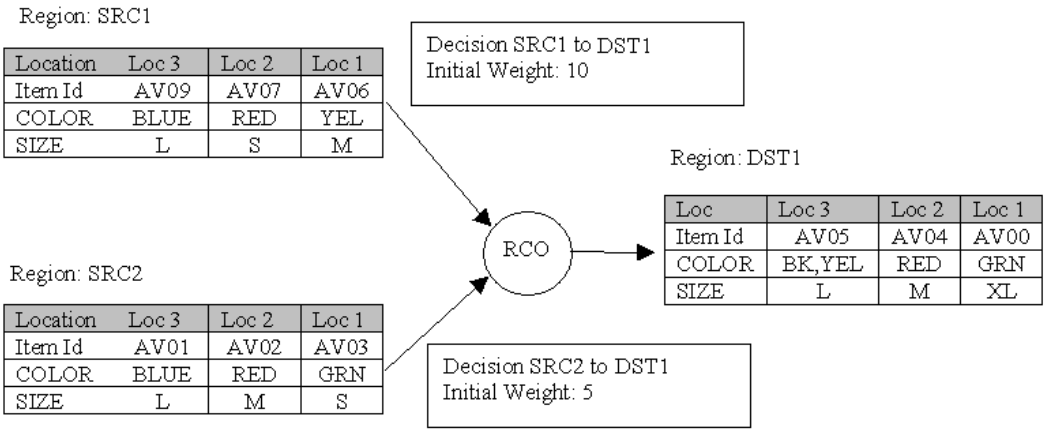
Parameters

This function block has the following parameters:

Parameter	Description
Decision ID	ID of decision to be eliminated.
Region ID	Region which contains the first item to compare.
Region Location	Location of first item in the region.
Item Class	Class of item to compare. Optional
Attribute ID	Attribute of first item to compare.
Start Character	Starting character of the attribute to be used.
Attribute Length	Specifies the number of characters in the attribute to compare. Enter zero in both the Start Character and Attribute Length fields to use all characters.
Condition	Type of Comparison - Greater Than, Less Than, Equals.
Comparison	Specifies the comparison type – numeric, alphabetic.
Region ID	Region which contains the second item to compare.
Region Location	Location of second item in the region.
Item Class	Class of the second item.
Attribute ID	Attribute of second item to compare.
Start Character	Starting character of the attribute to be used.
Length	Number of characters to compare.

Example

Site is triggered and a logic module with a single extension, Eliminate Decision By Attribute Attribute, is run. The parameters are as follows:


Region: SRC1
Location Loc 3 Loc 2 Loc 1
Item Id AV09 AV07 AV06
COLOR BLUE RED YEL
SIZE L S M
Decision SRC1 to DST1
Initial Weight: 10
Region: DST1
Loc Loc 3 Loc 2 Loc 1
Item Id AV05 AV04 AV00
COLOR BK,YEL RED GRN
SIZE L M XL
RCO
Region: SRC2
Location Loc 3 Loc 2 Loc 1
Item Id AV01 AV02 AV03
COLOR BLUE RED GRN
SIZE L M S
Decision SRC2 to DST1
Initial Weight: 5

Parameter Name	Parameter Value
Decision ID	SRC1 to DST1
Region ID	SRC1
Region Location	1
Item Class	VEHICLE
Attribute ID	COLOR
Start Character	0
Attribute Length	0
Condition	Equals
Comparison Type	Alphanumeric
Region ID	DST1
Region Location	PRT_LAST
Item Class	
Attribute ID	COLOR
Start Character	4
Length	3

1. The value of the Color attribute of the item in the head location of region SRC1 is YEL.
2. The value of characters 4 to 7 of the Color attribute of the item in the last location of region DST1 is YEL.
3. The attributes match so decisions SRC1 to DST1 is eliminated.

Pseudo Code

```
Get the First Attribute value
Get the second attribute value
Switch comparison type
  Case Greater than
If (attribute1 is > attribute2)
      Eliminate the decision
End if
  Case Less Than:
    If (attribute 1 is < attribute 2)
      Eliminate the decision
    End if
  Case Equal To
    If (attribute 1 = = attribute 2)
      Eliminate the decision
End if
End switch
```

Note: Comparison is case sensitive.

Eliminate Decision by Attribute Point

Description

`Eliminate Decision by Attribute Point` eliminates a decision based on the comparison of an attribute to a point value. If the comparison is true, the decision is eliminated.

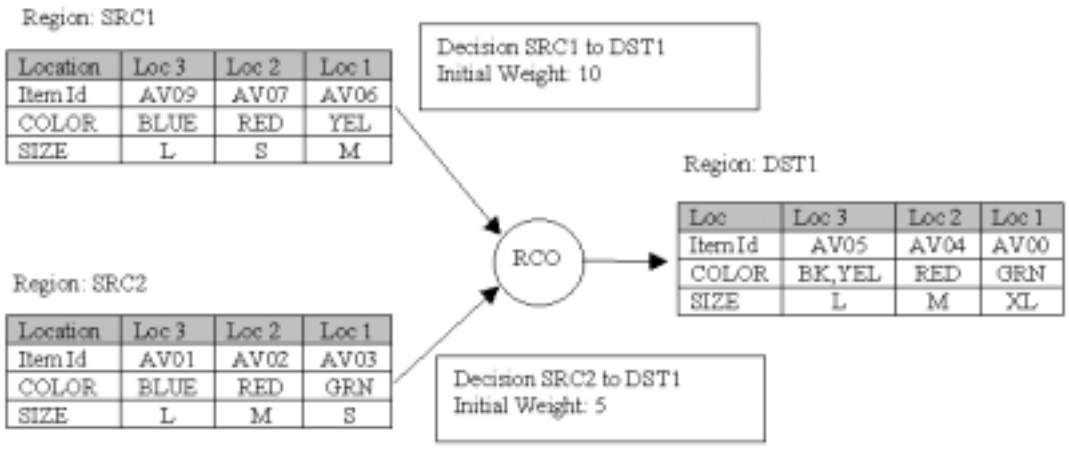
Parameters

This function block has the following parameters:

Parameter	Description
Decision ID	ID of decision to be eliminated.
Region ID	Region which contains the item to compare.
Region Location	Location of item in the region.
Item Class	Class of item to compare.
Attribute ID	Attribute of first item to compare.
Start Character	Starting character of the attribute to be used.
Attribute Length	Specifies the number of characters in the attribute to compare. Enter zero in both the Start Character and Attribute Length fields to use all characters.
Condition	Type of Comparison - Greater Than, Less Than, Equals.
Comparison Type	Numeric or alphanumeric comparison. If numeric comparison is selected, values are converted to integers before comparison.
Point ID	ID of point whose value is to be compared.

Example

Site is triggered and a logic module with a single extension, *Eliminate Decision by Attribute Point*, is run. The parameters are as follows:


Region: SRC1
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV09 | AV07 | AV06
COLOR | BLUE | RED | YEL
SIZE | L | S | M
Decision SRC1 to DST1
Initial Weight: 10
Region: DST1
Loc | Loc 3 | Loc 2 | Loc 1
Item Id | AV05 | AV04 | AV00
COLOR | BK,YEL | RED | GRN
SIZE | L | M | XL
RCO
Region: SRC2
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV01 | AV02 | AV03
COLOR | BLUE | RED | GRN
SIZE | L | M | S
Decision SRC2 to DST1
Initial Weight: 5

Parameter Name	Parameter Value
Decisions ID	SRC1 to DST1
Region ID	SRC1
Region Location	1
Item Class	VEHICLE
Attribute ID	COLOR
Start Character	0
Attribute Length	0
Comparison Operator	Equals
Comparison Type	Numeric
Point ID	COMPARE_POINT

1. The value of the Color attribute of the item in the head location of region SRC1 is YEL.
2. The value of the point is YEL.
3. The attribute and the point value match, so decisions SRC1 to DST1 is eliminated.

Pseudo Code

```
Get the First Attribute value
Get the Point Value
Switch comparison operator
  Case Greater than
If (attribute1 is > Point Value)
      Eliminate the decision
End if
  Case Less Than:
    If (attribute 1 is < Point Value)
      Eliminate the decision
    End if
  Case Equal To
    If (attribute 1 = = Point Value)
      Eliminate the decision
End if
End switch
```

Note: Alphanumeric comparison is case sensitive.

Eliminate Decision by Attribute Value

Description

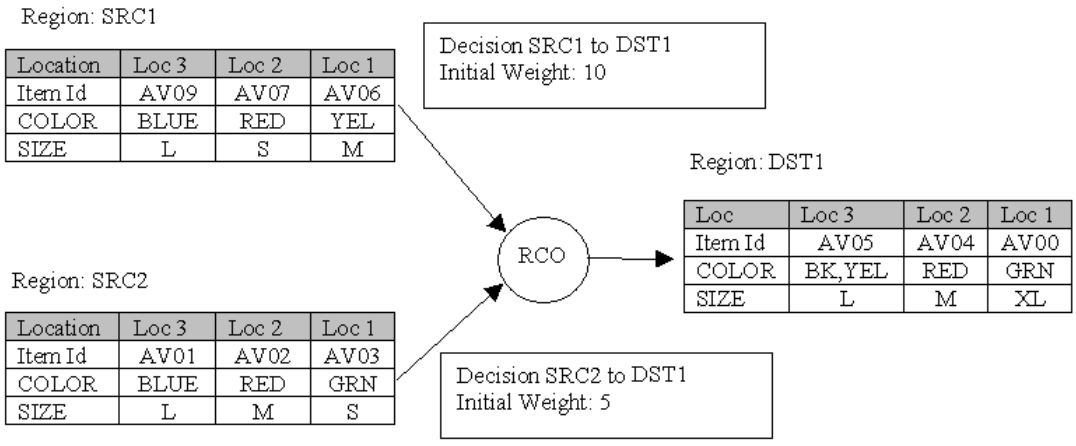
`Eliminate Decision by Attribute Value` eliminates a decision based on the comparison of an attribute value to a RCO variable or hard coded value.

Parameters

This function block has the following parameters:

Parameter	Description
Decision ID	ID of decision to be eliminated.
Region ID	Region which contains the item to compare.
Region Location	Location of item in the region.
Item Class	Class of item to compare.
Attribute ID	Attribute of first item to compare.
Start Character	Starting character of the attribute to be used.
Attribute Length	Specifies the number of characters in the attribute to compare. Enter zero in both the Start Character and Attribute Length fields to use all characters.
Condition	Type of Comparison - Greater Than, Less Than, Equals.
Comparison Type	Numeric or Alphanumeric comparison. If numeric comparison is selected, attribute and value are converted to integers before comparison.
Value	Select an RCO Variable name or type a value.

Example


Region: SRC1
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV09 | AV07 | AV06
COLOR | BLUE | RED | YEL
SIZE | L | S | M
Decision SRC1 to DST1
Initial Weight: 10
Region: DST1
Loc | Loc 3 | Loc 2 | Loc 1
Item Id | AV05 | AV04 | AV00
COLOR | BK,YEL | RED | GRN
SIZE | L | M | XL
RCO
Region: SRC2
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV01 | AV02 | AV03
COLOR | BLUE | RED | GRN
SIZE | L | M | S
Decision SRC2 to DST1
Initial Weight: 5

Site is triggered and a logic module with a single extension, *Eliminate Decision By AttributeValue*, is run. The parameters are as follows:

Parameter Name	Parameter Value
Decision ID	SRC1 to DST1
Region ID	SRC1
Region Location	1
Item Class	VEHICLE
Attribute ID	COLOR
Start Character	0
Attribute Length	0
Comparison Operator	Equals
Comparison Type	Alphanumeric
Value	YEL

1. The value of the Color attribute of the item in the head location of region SRC1 is YEL.
2. The value is YEL.
3. The attributes and the value match, decisions SRC1 to DST1 is eliminated.

Pseudo Code

```
Get the Attribute
Switch comparison type
Case Greater than
  If (attribute1 is > Value)
      Eliminate the decision
  End if
Case Less Than:
    If (attribute 1 is < Value)
      Eliminate the decision
    End if
Case Equal To
    If (attribute 1 = = Value)
      Eliminate the decision
    End if
End switch
```

Note: Alphanumeric comparison is case sensitive.

Eliminate Decision by Increasing Weight Percentages

Description

`Eliminate a Decision by Increasing Weight Percentages` will adjust a decision's weight, and is usually run in conjunction with **`the Select Decision with Highest Order & Weight`** function block. The weight change only has effect during the current control cycle.

Modifications

This function block has an additional parameter, an array Point ID that lists the item class for each attribute. Only items that belong to the specified item class will be considered. Remainder of this function block is unchanged.

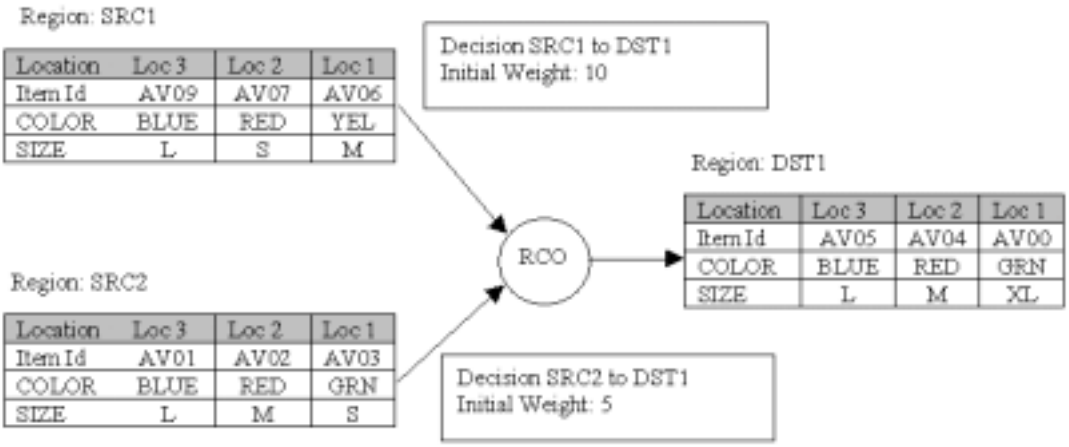
Parameters

This function block has the following parameters:

Parameter	Description
Always Evaluate	Hard, Soft or Breakable. This parameter controls what happens when the extension eliminates all available decisions. Hard: All decisions will remain eliminated. Enter a wait state after the logic script has completed. Soft: Roll back any decisions eliminated by this extension. Breakable: Roll back any decisions eliminated by this extension that have a danger point value of TRUE (non zero). The routing modules will first use the danger defined for each individual decision and, if no danger point has been configured for the decision, then the site-wide danger point will be used. If no danger point can be found for a decision, then the decision remain eliminated.
Item Class	Name of array point that lists item class of the item that contains the attribute. Specify the class of the items to be considered or leave blank for all items.
Attribute Name	Name of the array point that lists the attribute names to be compared.
Attribute Value	Name of the array point that contains the Attribute Value. Each ELEMENT can contain one or multiple values separated by a comma. Do not include quotes. For example, element 0 = **`Blue,Green`** element 1 = **`K`**
Upper Release % Target	The upper percentage limit, of an acceptable range, for vehicles that **should be** released from the bank with the corresponding attribute value.

Lower Release % Target	The lower percentage limit, of an acceptable range, for vehicles that **should be** released from the bank with the corresponding attribute value.
Attribute Released Count	The actual number of vehicles released from the bank with the corresponding attribute value.
Total Released Count	A counter point containing the total number of jobs released from the bank.

Example


Region: SRC1
Location Loc 3 Loc 2 Loc 1
Item Id AV09 AV07 AV06
COLOR BLUE RED YEL
SIZE L S M
Decision SRC1 to DST1
Initial Weight: 10
Region: DST1
Location Loc 3 Loc 2 Loc 1
Item Id AV05 AV04 AV00
COLOR BLUE RED GRN
SIZE L M XL
RCO
Region: SRC2
Location Loc 3 Loc 2 Loc 1
Item Id AV01 AV02 AV03
COLOR BLUE RED GRN
SIZE L M S
Decision SRC2 to DST1
Initial Weight: 5

Offset	Item Class	Attribute Name	Attribute Value	Upper %	Lower %	Attribute Count	Total Count
0	VEHICLE	COLOR	YEL,GRN	75	25	10	100
1	VEHICLE	SIZE	M	50	10	90	1

`Array Offset 0`

`SRC1.`

Head Item with class of VEHICLE has a color attribute of YEL. Possible attribute values are YEL and GRN. We have a match so the Attribute Percentage has the following formula:

Attribute Percent = Attribute Release Count / total Count * 100

10= 10/100 * 100

Since Attribute Percent is lower than lo %, the decision weight is increased as follows:

Weight Delta = Upper % - Attrib %

65 = 75 – 10

So the weight will now be 75 for the decision.

SRC2.

Head Item with class of VEHICLE has a color attribute of GRN. Possible attribute values are YEL and GRN. We have a match so the Attribute Percentage has the following formula:

Attribute Percent = Attribute Release Count / Total Count * 100

10 = 10/100 * 100

Since Attribute Percent is lower than lo %, the decision weight is increased as follows:

Weight Delta = Upper % - Attrib %

65 = 75 - 10

So the weight will no be 70 for the decision.

Array Offset 1

SRC1.

Head Item with class of VEHICLE has a size attribute of M. Possible attribute values are S M L XL. We have a match so the Attribute Percentage has the following formula:

70 = 70/100 * 100

Since this value is greater than the Upper %, the decision is eliminated.

SRC2.

Head Item with class of VEHICLE has a size attribute of S. There is no match so the decision is skipped.

Thus SRC2 is the only decision remaining, so it will be selected.

Note: In the event there are multiple decisions remaining that have had their weights increased, the Select Decision with Highest Order and Weight Function Block can be run to select the appropriate decision.

Pseudo Code

```
For each attribute name
  For each decision
    For each Item in head location of source region
      If the attribute is found in the Item
         Attrib Percent = 0
         If Total Released Count !=0
            Attribute Percent = Attribute Release Count / Total
            Released Count * 100
         If Attrib Percent > Upper Release Target %
            Elminiate Decision
            Alarm if no more decisions else continue
         If Attrib Percent < Lower Release Target %
            SetWeight (current decision weight + Upper Release Target
            % - Attrib Percent)
```

Eliminate Decision by Point

`Eliminate Decision by Point` is obsolete. Use the current function blocks:

- `Eliminate Decision by Point Point` and
- `Eliminate Decision by Point Value`.

Eliminate Decision by Point Point

Description

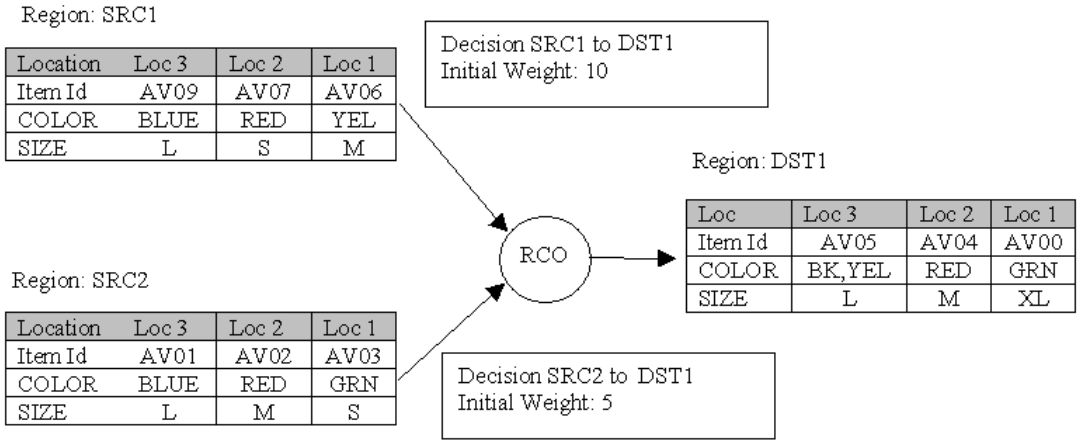
`Eliminate Decision by Point Point` eliminates a decision based on the comparison of two point values.

Parameters

This function block has the following parameters:

Parameter	Description
Decision ID	ID of the decision to be eliminated.
Point ID 1	ID of the point whose value is to be compared.
Comparison Operator	Type of Comparison - Greater Than, Less Than, Equals.
Point ID 2	ID of second point whose value is to be compared.
Comparison Type	Numeric or alphanumeric comparison. If numeric comparison is selected, values are converted to integers before comparison.

Example


Region: SRC1
Location Loc 3 Loc 2 Loc 1
Item Id AV09 AV07 AV06
COLOR BLUE RED YEL
SIZE L S M
Decision SRC1 to DST1
Initial Weight: 10
Region: DST1
Loc Loc 3 Loc 2 Loc 1
Item Id AV05 AV04 AV00
COLOR BK,YEL RED GRN
SIZE L M XL
RCO
Region: SRC2
Location Loc 3 Loc 2 Loc 1
Item Id AV01 AV02 AV03
COLOR BLUE RED GRN
SIZE L M S
Decision SRC2 to DST1
Initial Weight: 5

Site is triggered and a logic module with a single extension, *Eliminate Decision by Point Point*, is run. The parameters are as follows:

Parameter Name	Parameter Value
Decision ID	SRC1 to DST1
Point ID 1	COMPARE_1
Comparison Operator	Equals
Point ID 2	COMPARE_2
Comparison Type	Alphanumeric

1. The value of point COMPARE_1 is YEL.
2. The value is point COMPARE_2 is YEL.
3. The point values match, decisions SRC1 to DST1 is eliminated.

Pseudo Code

```
Get value of point 1
GetValue of Point 2
Switch comparison type
      Case Greater than
    If (Value 1 is > Value 2)
      Eliminate the decision
    End if
Case Less Than:
    If (Value 1 is < Value 2)
      Eliminate the decision
    End if
Case Equal To
    If (Value 1 = = Value 2)
      Eliminate the decision
    End if
End swithc
```

Note: Alphanumeric comparison is case sensitive.

Eliminate Decision by Point Value

Description

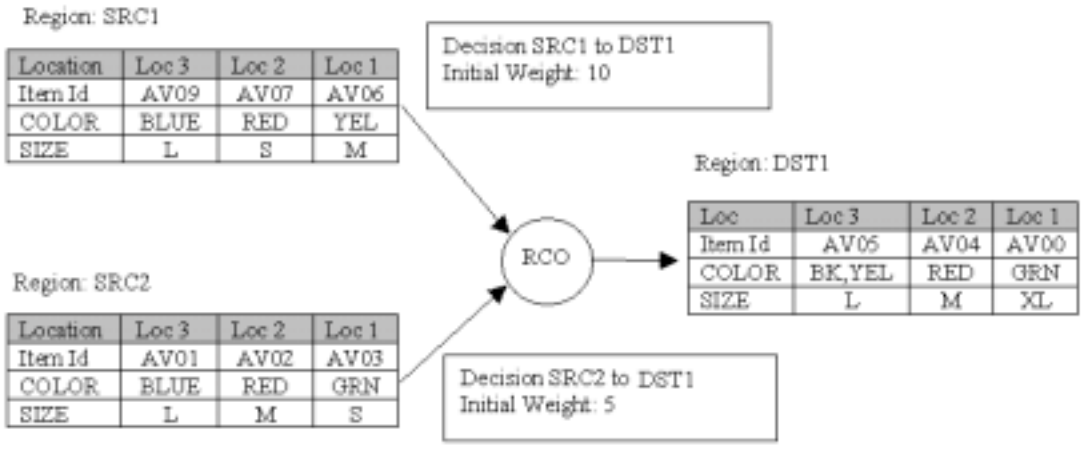
`Eliminate Decision by Point Value` eliminates a decision based on the comparison of a point to a value.

Parameters

This function block has the following parameters:

Parameter	Description
Decision ID	ID of the decision to be eliminated.
Point ID 1	ID of the point whose value is to be compared.
Comparison Operator	Type of Comparison - Greater Than, Less Than, Equals.
Value	Drop List combo listing the available RCO variables. Operator may select a RCO Variable from the list or type any value.
Comparison Type	Numeric or alphanumeric comparison. If numeric comparison is selected, values are converted to integers before comparison.

Example


Region: SRC1
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV09 | AV07 | AV06
COLOR | BLUE | RED | YEL
SIZE | L | S | M
Decision SRC1 to DST1
Initial Weight: 10
Region: DST1
Loc | Loc 3 | Loc 2 | Loc 1
Item Id | AV05 | AV04 | AV00
COLOR | BK,YEL | RED | GRN
SIZE | L | M | XL
RCO
Region: SRC2
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV01 | AV02 | AV03
COLOR | BLUE | RED | GRN
SIZE | L | M | S
Decision SRC2 to DST1
Initial Weight: 5

Site is triggered and a logic module with a single extension, *Eliminate Decision by Point Value*, is run. The parameters are as follows:

Parameter Name	Parameter Value
Decision ID	SRC1 to DST1
Point ID 1	COMPARE_1
Comparison Operator	Equals
Value	GRN
Comparison Type	Alphanumeric

1. The value of point COMPARE_1 is YEL.
2. The point value does not match the value, so decision SRC1 to DST1 is not eliminated.

Pseudo Code

```
Get value of point 1
Switch comparison type
  Case Greater than
    If (Point Value is > Value)
      Eliminate the decision
    End if
  Case Less Than:
    If (Point Value is < Value)
      Eliminate the decision
    End if
  Case Equal To
    If (Point Value = = Value)
      Eliminate the decision
    End if
End switch
```

Note: Alphanumeric comparison is case sensitive.

Eliminate Decision if not only Decision

Description

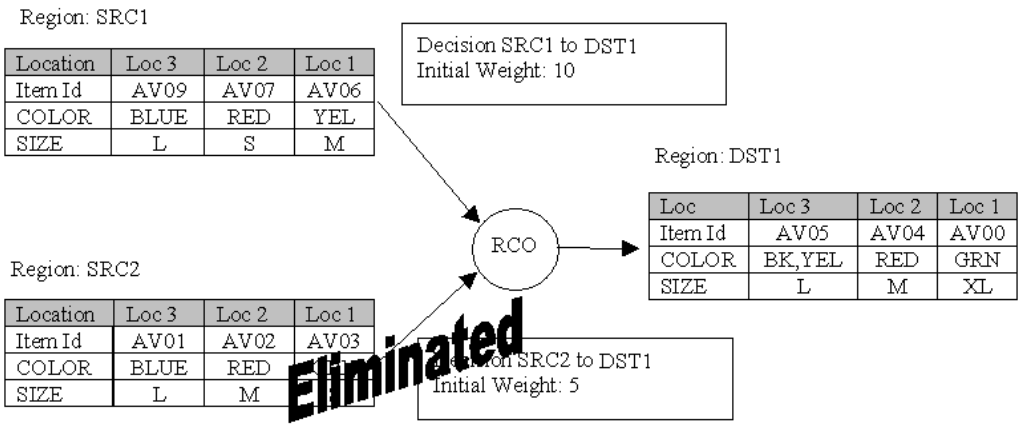
`Eliminate Decision if not only Decision` eliminates the decision if there is more than one decision not yet eliminated.

Parameters

This function block has the following parameter:

Parameter	Description
Decision ID	The decision to be eliminated.

Example


Region: SRC1
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV09 | AV07 | AV06
COLOR | BLUE | RED | YEL
SIZE | L | S | M
Decision SRC1 to DST1
Initial Weight: 10
Region: DST1
Loc | Loc 3 | Loc 2 | Loc 1
Item Id | AV05 | AV04 | AV00
COLOR | BK,YEL | RED | GRN
SIZE | L | M | XL
RCO
Region: SRC2
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV01 | AV02 | AV03
COLOR | BLUE | RED
SIZE | L | M
Eliminated
Initial Weight: 5

Site is triggered and a logic module with a multiple Function Blocks is run. The last Function Block, *Eliminate Decision If Not Only Decision*, is executed as in the example. The parameters are as follows:

Parameter Name	Parameter Value
Decision ID	SRC1 to DST1

1. Get the decision list.
2. The decision count is 1 because decision SRC2 to DST1 has been eliminated.
3. Decision SRC1 to DST1 has been eliminated.

Pseudo Code

```
Get the list of still possible decisions
If (the list count is greater than 1
  or ( decision count == 1 and decision[1] == decision id) than
  Eliminate decision
End If
```

Eliminate Decision

Description

`Eliminate Decision` eliminates the specified decision.

Parameters

This function block has the following parameter:

Parameter	Description
Decision	Decision name to be eliminated. Select All to eliminate all decisions.

Note: Comparison is case sensitive.

Eliminate Decisions with no Items in Source

Description

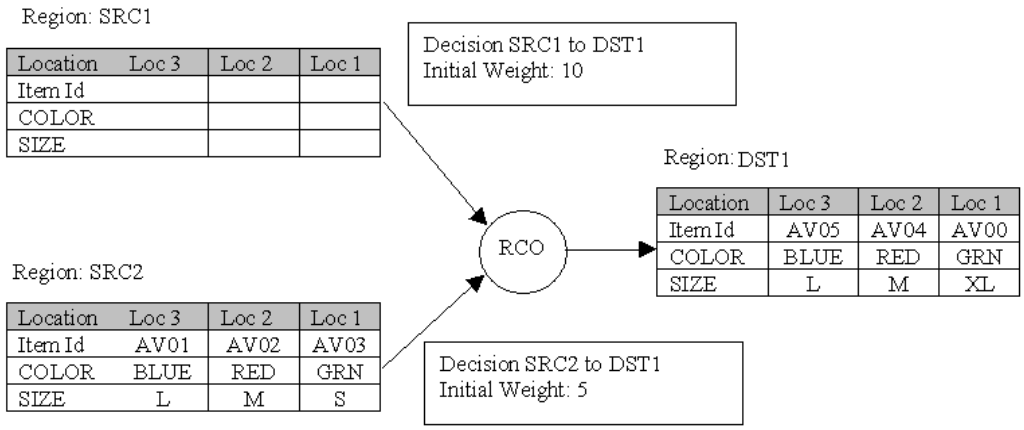
`Eliminate Decisions with no Items in Source` eliminates all decisions with no items in the source region's head location.

Parameters

This function block has the following parameters:

Parameter	Description
Always Evaluate	Hard, Soft or Breakable. This parameter controls what happens when the extension eliminates all available decisions. Hard: All decisions will remain eliminated. Enter a wait state after the logic script has completed. Soft: Roll back any decisions eliminated by this extension. Breakable: Roll back any decisions eliminated by this extension that have a danger point value of TRUE (non zero). The routing modules will first use the danger defined for each individual decision and, if no danger point has been configured for the decision, then the site-wide danger point will be used. If no danger point can be found for a decision, then the decision remain eliminated.

Example



Site is triggered and a logic module with a single extension, Eliminate Decisions with No Items in Source, is run.

Decisions SRC1 to DST1 is eliminated because there are no items in the head location of the source region.

Pseudo Code

```
For each decision still possible
  Get the number of items at the source region’s head location.
  If head location is empty
    Eliminate the decision.
  End if
Next
```

Get Trigger Name

Description

`Get Trigger Name` will retrieve the name of the trigger that activated the site. If the trigger was timed or automatic, the trigger named will be "Automatic"; if the trigger was manual, then the trigger named will be "Manual."

Parameters

This function block has no parameters.

Example

Not available for this release.

Pseudo Code

Not available for this release.

Return Value

The name of the trigger can be stored in an RCO Variable. Once the trigger name is stored, it can be logged or used as needed.

Item Type Translation

Description

`Item Type Translation` translates the input code to Item Type ID or vice versa, Item Type ID to input code, depending on the value of the output.

Parameters

This function block has the following parameters:

Parameter	Description
Translation ID	RCO Variable: specify the Translation ID to reference from the prt_type_trn configuration file.
Input Code	RCO Variable: this value must be supplied if the output is set to Item Type ID. This will be populated with the translated input code if output is set to input code.
Output	Specify the output to be either input code or Item Type ID.
Item Type ID	RCO Variable: This value must be supplied if the output is set to input code. This will be populated with the translated Item Type ID if output is set to Item Type ID.

Pseudo Code

```
If Output = Input Code
   Input Code = ItemTypeTranslation Translation ID, Item Type ID

Else
   Item Type ID = ItemTypeTranslation Translation ID, Input Code
```

Look Back Blocking

Description

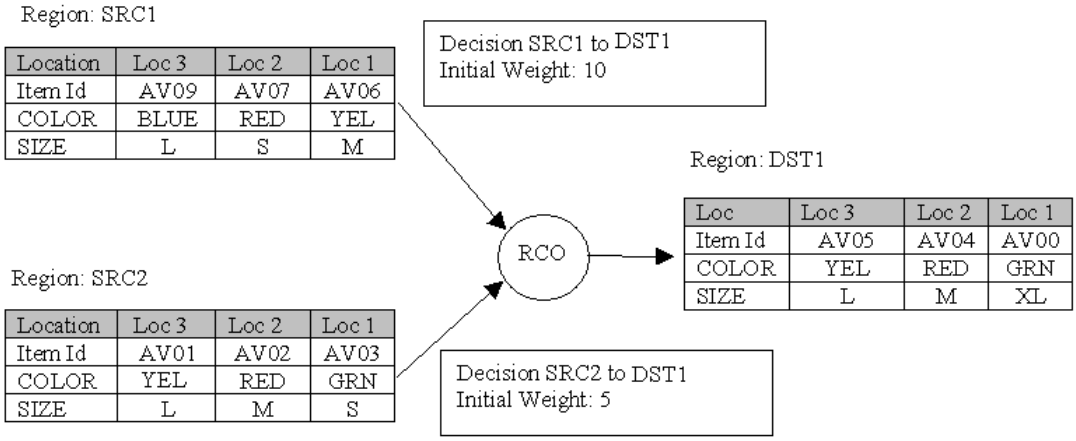
Look Back Blocking eliminates decisions where the specified attribute in the tail item of the destination region match the corresponding attribute in one or more items following the head item of the source region.

Parameters

This function block has the following parameters:

Parameter	Description
Always Evaluate	Hard, Soft or Breakable. This parameter controls what happens when the extension eliminates all available decisions. Hard: All decisions will remain eliminated. Enter a wait state after the logic script has completed. Soft: Roll back any decisions eliminated by this extension. Breakable: Roll back any decisions eliminated by this extension that have a danger point value of TRUE (non zero). The routing modules will first use the danger defined for each individual decision and, if no danger point has been configured for the decision, then the site-wide danger point will be used. If no danger point can be found for a decision, then the decision remain eliminated.
Region	Region to search. If blank, each decision's source region will be searched.
Last Location	Number of locations to look back.
Item Class	Class of item to compare.
Attribute ID	Attribute of first item to compare.
Start Character	Starting character of the attribute to be used.
Attribute Length	Specifies the number of characters in attribute to compare. Enter zero in both the Start Character and Attribute Length fields to use all characters.

Example


Region: SRC1
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV09 | AV07 | AV06
COLOR | BLUE | RED | YEL
SIZE | L | S | M
Decision SRC1 to DST1
Initial Weight: 10
Region: DST1
Loc | Loc 3 | Loc 2 | Loc 1
Item Id | AV05 | AV04 | AV00
COLOR | YEL | RED | GRN
SIZE | L | M | XL
RCO
Region: SRC2
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV01 | AV02 | AV03
COLOR | YEL | RED | GRN
SIZE | L | M | S
Decision SRC2 to DST1
Initial Weight: 5

Parameter	Value
Always Evaluate	Hard
Region	""
Look Back Factor	3
Item Class	VEHICLE
Attribute ID	COLOR
Start Character	0
Attribute Length	0

1. Decision SRC1 to DST1:

   Location 2, RED does not match destination region tail color attribute, YEL. Decision is ***not*** eliminated.

   Location 3, BLUE does not match destination region tail color attribute, YEL. Decision is ***not*** eliminated.

2. Decision SRC2 to DST1:

   Location 2, RED does not match destination region tail color attribute, YEL. Decision is ***not*** eliminated.

   Location 3, YEL does match destination region tail color attribute, YEL. Decision is eliminated.

Pseudo Code

```
For nlocation = 2 to look_back_factor
  For each decision
    If the decision is still possible
      If user specified region is blank
        Get the items in nLocation from the decision source region
      else
        Get the items in nLocation from the user specified region
      End if
      If number of items in region > 0
        Get items in the tail location of the decision destination region
        If number of items in tail location > 0
          If attribute matches for items with user specified class
            Eliminate current decision
          End if
        End if
      End if
    End if
  Next Decision
Next Location
```

SelectDecisionByAttribute

SelectDecisionByAttribute is obsolete. Use the current function blocks:

- Select Decision by Attribute Point,
- Select Decision by Attribute Value and
- Select Decision by Point Value.

Select Decision by Attribute Point

Description

Select Decision By Attribute Point selects a named decision based on the comparison of a point and an attribute.

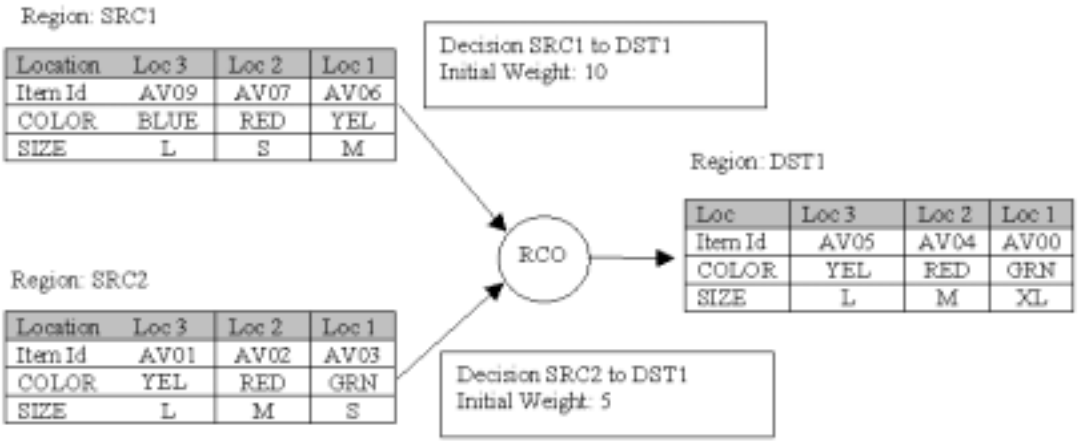
Parameters

This function block has the following parameters:

Parameter	Description
Location	Location within the decision source region, of the item attribute to compare.
Item Class	Class of the item to compare.
Attribute ID	ID of attribute to compare.
Start Character	Starting character within attribute.
Attribute Length	Specifies the number of characters in attribute to compare. Enter zero in both the Start Character and Attribute Length fields to use all characters.
Point ID	ID of point to use in comparison.
Decision	Name of decision to select.

Condition	Comparison operator, Match, Mismatch, Greater or Lessor.
Type of Comparison	Type of compare, either numeric comparison or alphabetic comparison.

Example


Region: SRC1
Location Loc 3 Loc 2 Loc 1
Item Id AV09 AV07 AV06
COLOR BLUE RED YEL
SIZE L S M
Decision SRC1 to DST1
Initial Weight: 10
Region: DST1
Loc Loc 3 Loc 2 Loc 1
Item Id AV05 AV04 AV00
COLOR YEL RED GRN
SIZE L M XL
RCO
Region: SRC2
Location Loc 3 Loc 2 Loc 1
Item Id AV01 AV02 AV03
COLOR YEL RED GRN
SIZE L M S
Decision SRC2 to DST1
Initial Weight: 5

Parameter	Value
Location	PRT_FIRST
Item Class	VEHICLE
Attribute ID	COLOR
Start Character	0
Attribute Length	0
Point ID	COMPARE_POINT
Decision	SRC1_TO_DST1
Comparison	MISMATCH
Type of Comparison	Numeric

1. Value of point COMPARE_POINT is “BLUE”.
2. Value of attribute of first item at the head location of region SRC1 is “YEL”.
3. The values do not match, the decision is selected.

Pseudo Code

```
Get the value of the point
For each decision
  Get item at user specified location and region
  Get the value of the attribute
  Switch comparison type
      Case Match:
        If point value = attribute value
          Select the decision
          Exit sub
        End if
    Case MisMatch:
        If  point value != attribute value
          Select the decision
          Exit sub
        End if
    Case Greater:
        If point value > attribute value
          Select the decision
          Exit sub
        End if
    Case Lessor:
        If point value < attribute value
                  select the decision
                  exit sub
                       End if
         End switch
Next Decision
```

Note: If the specified decision is already eliminated, the function block will not re-select the decision or eliminate any other decisions.

If the decision was selected, the logic script will immediately exit.

Select Decision by Attribute Value

Description

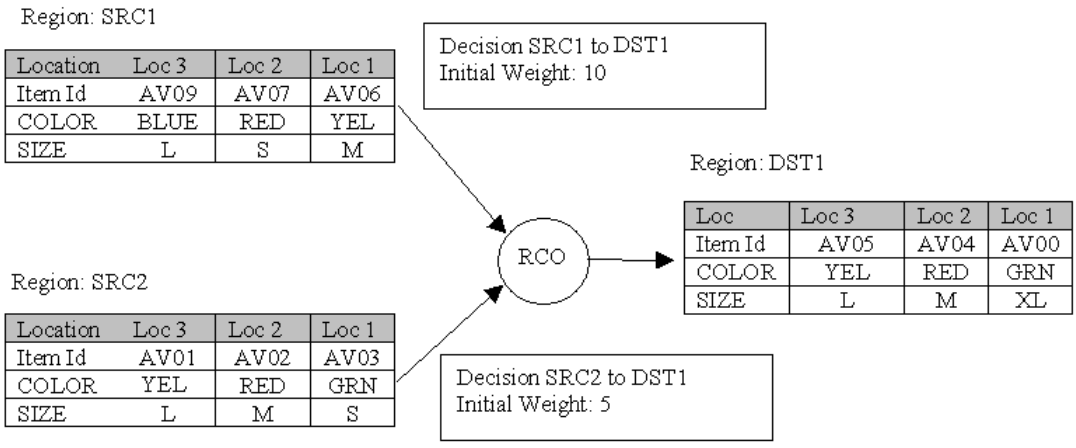
`Select Decision by Attribute Value` confirms that a decision is valid by making an attribute value comparison.

Parameters

This function block has the following parameters:

Parameter	Description
Location	Location within the decision source region, of the item attribute to compare.
Item Class	Class of the item to compare.
Attribute ID	ID of attribute to compare.
Start Character	Starting character within attribute.
Attribute Length	Specifies number of characters in attribute to compare. Enter zero in both the Start Character and Attribute Length fields to use all characters.
Value	Value to use in comparison.
Decision	Name of decision to select.
Condition	Comparison operator, Match, Mismatch, Greater or Lessor.
Type of Comparison	Type of compare, either numeric comparison or alphabetic comparison.

Example


Region: SRC1
Location Loc 3 Loc 2 Loc 1
Item Id AV09 AV07 AV06
COLOR BLUE RED YEL
SIZE L S M
Decision SRC1 to DST1
Initial Weight: 10
Region: DST1
Loc Loc 3 Loc 2 Loc 1
Item Id AV05 AV04 AV00
COLOR YEL RED GRN
SIZE L M XL
RCO
Region: SRC2
Location Loc 3 Loc 2 Loc 1
Item Id AV01 AV02 AV03
COLOR YEL RED GRN
SIZE L M S
Decision SRC2 to DST1
Initial Weight: 5

Parameter	Value
Location	PRT_FIRST
Item Class	VEHICLE
Attribute ID	COLOR
Start Character	0
Attribute Length	0
Value	BLUE
Decision	SRC1_TO_DST1
Condition	MISMATCH
Type of Comparison	Alpha

1. Compare Value “BLUE."
2. Value of attribute of first item at the head location of region SRC1 is “YEL."
3. The values do not match, the decision is selected.
4. The logic script exits.

Pseudo Code

```
For each decision
  Get item at user specified location and region
  Get the value of the attribute
  Switch comparison type
      Case Match:
        If point value = attribute value
          Select the decision
          Exit sub
        End if
      Case MisMatch:
        If  point value != attribute value
          Select the decision
          Exit sub
        End if
      Case Greater:
        If point value > attribute value
          Select the decision
          Exit sub
        End if
    Case Lessor:
        If point value < attribute value
                  select the decision
                  exit sub
                       End if
         End Switch
Next Decision
```

Note: If the specified decision is already eliminated, the function block will not re-select the decision or eliminate any other decisions.

If the decision was selected, the logic script will immediately exit.

Select Decision by Point Value

Description

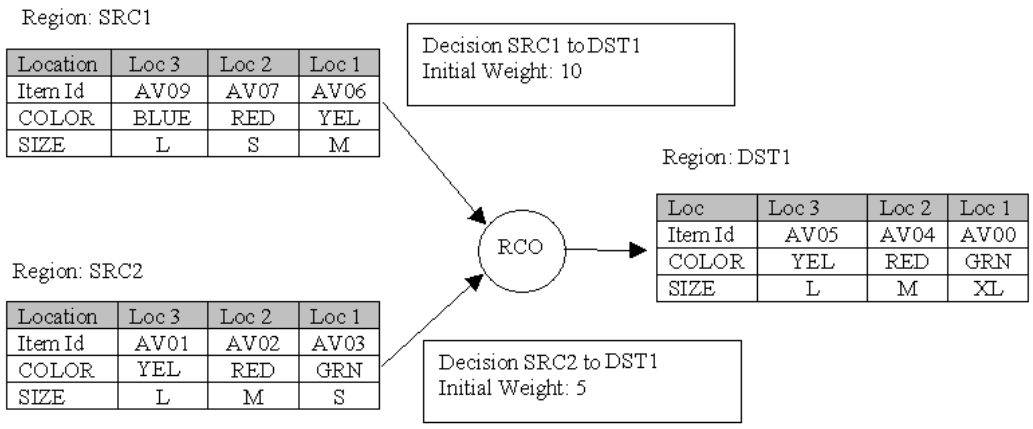
`Select Decision by Point Value` confirms that a user specified decision is valid if the specified value matches a specified point.

Parameters

This function block has the following parameters:

Parameter	Description
Point ID	ID of point value to compare.
Value	Value to compare. May be hard coded or a RCO Variable.
Decision	ID of decision to select.
Condition	Type of comparison, Match, Mismatch, Greater or Lessor.
Type of Comparison	Type of compare, either numeric comparison or alphabetic comparison.

Example


Region: SRC1
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV09 | AV07 | AV06
COLOR | BLUE | RED | YEL
SIZE | L | S | M
Decision SRC1 to DST1
Initial Weight: 10
Region: DST1
Loc | Loc 3 | Loc 2 | Loc 1
Item Id | AV05 | AV04 | AV00
COLOR | YEL | RED | GRN
SIZE | L | M | XL
RCO
Region: SRC2
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV01 | AV02 | AV03
COLOR | YEL | RED | GRN
SIZE | L | M | S
Decision SRC2 to DST1
Initial Weight: 5

Parameter	Value
Point ID	COMPARE_POINT
Value	3
Decision	SRC1_TO_DST1
Comparison operator	Greater
Comparison Type	Numeric

1. Compare value of point COMPARE_POINT to Compare Value of "3."
2. Specified value of “3” is not greater then point value of 3. Decision is *not* selected.

Pseudo Code

```
Get the value of the point
Get item at user specified location and region
Get the value of the attribute
Switch comparison type
  Case Match:
    If point value = value
      Select the decision
      Exit sub
    End if
  Case MisMatch:
    If  point value != value
      Select the decision
      Exit sub
    End if
  Case Greater:
    If point value > value
      Select the decision
      Exit sub
    End if
  Case Lessor:
    If point value < value
              select the decision
              exit sub
            end if
        end switch
```

Note: If the specified decision is already eliminated, the function block will not re-select the decisions or eliminate any other decisions.

If decision is selected, the logic script exits.

Select Decision with Highest Order & Weight

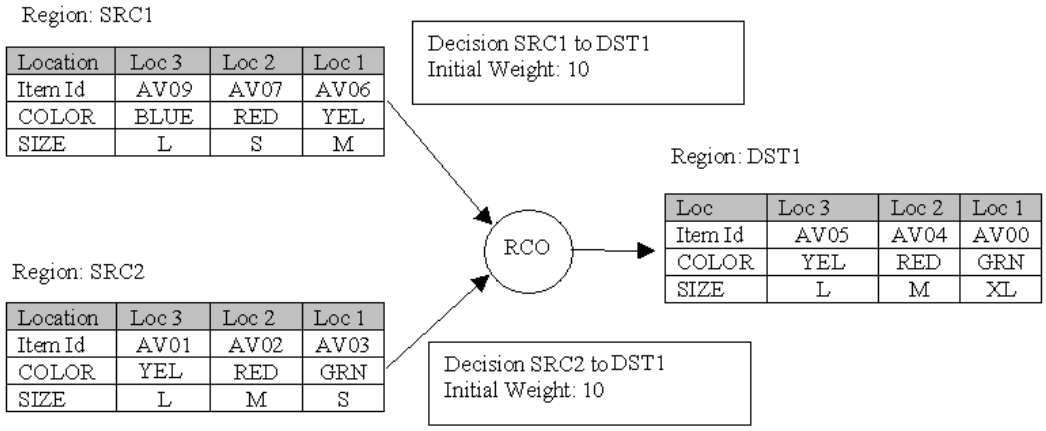
Description

`Select Decision with Highest Order & Weight` confirms that the decision with the largest weight is valid, using order as a tie breaker.

Parameters

This function block has no parameters.

Example


Region: SRC1
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV09 | AV07 | AV06
COLOR | BLUE | RED | YEL
SIZE | L | S | M
Decision SRC1 to DST1
Initial Weight: 10
Region: DST1
Loc | Loc 3 | Loc 2 | Loc 1
Item Id | AV05 | AV04 | AV00
COLOR | YEL | RED | GRN
SIZE | L | M | XL
RCO
Region: SRC2
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV01 | AV02 | AV03
COLOR | YEL | RED | GRN
SIZE | L | M | S
Decision SRC2 to DST1
Initial Weight: 10

1. Decision SRC1 to DST1, has weight of 10 and order of 1. This decision is tied for the highest weight, but not the highest order. This decision is eliminated.
2. Decision SRC2 to DST1, has a weight of 10 and an order of 2. This decision is tied for the highest weight, and also has the highest order. This decision is *not* eliminated.

Pseudo Code

```
For each decision
  If decision is still possible
    If decision has highest weight
      Store decision offset
    End if
  End if
Next decision
If any decisions found
  Select the decision with the highest weight and order
End if
```

Note: The order of the decision is determined by its position in the Routing Control Configuration tree. The first decision in the tree has the lowest order.

If all decisions have already been eliminated, the logic script will not terminate.

Select Decision

Description

`Select Decision` checks to make sure that the decision made is valid.

Parameters

This function block has the following parameters:

Parameter	Description
Decision Name	ID of the decision to be selected.

Select Highest Order Decision

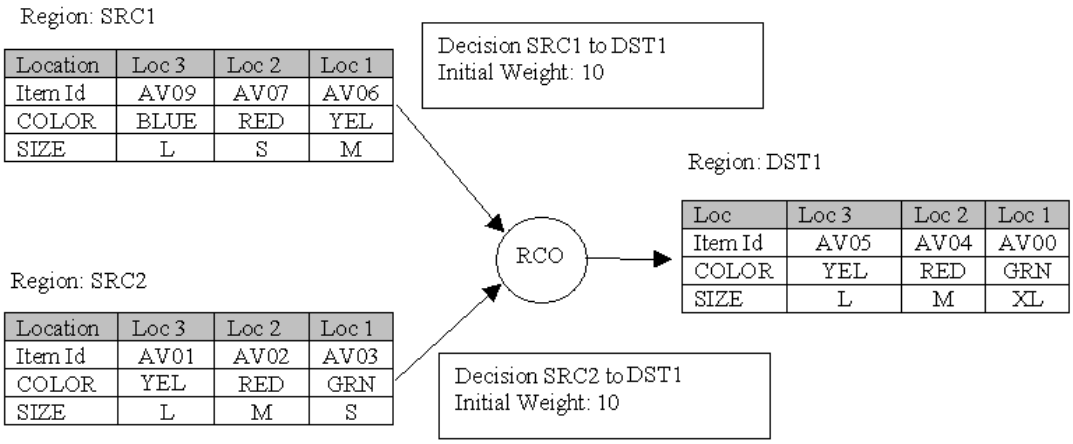
Description

`Select Highest Order Decision` confirms that a decision made based on the highest order is valid.

Parameters

This function block has no parameters.

Example


Region: SRC1
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV09 | AV07 | AV06
COLOR | BLUE | RED | YEL
SIZE | L | S | M
Decision SRC1 to DST1
Initial Weight: 10
Region: DST1
Loc | Loc 3 | Loc 2 | Loc 1
Item Id | AV05 | AV04 | AV00
COLOR | YEL | RED | GRN
SIZE | L | M | XL
RCO
Region: SRC2
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV01 | AV02 | AV03
COLOR | YEL | RED | GRN
SIZE | L | M | S
Decision SRC2 to DST1
Initial Weight: 10

1. Decision SRC1 to DST1, has an order of 1. This decision is not the highest order decision, so it is eliminated.
2. Decision SRC2 to DST1, has an order of 2. This decision has the highest order, so it is *not* eliminated.

Pseudo Code

```
For each decisions
  If the decision is still possible
    If the decision has the highest order
      Save the decision offset
    End if
  End if
Next decision
Select the decisions with the highest order
```

See Also

Select Lowest Order Decision.

Note: The decision order is determined by its position in the Routing Control Configuration tree.

After this decision executes, the logic script stops.

If all decisions have already been eliminated, the logic script will not terminate.

Select Lowest Order Decision

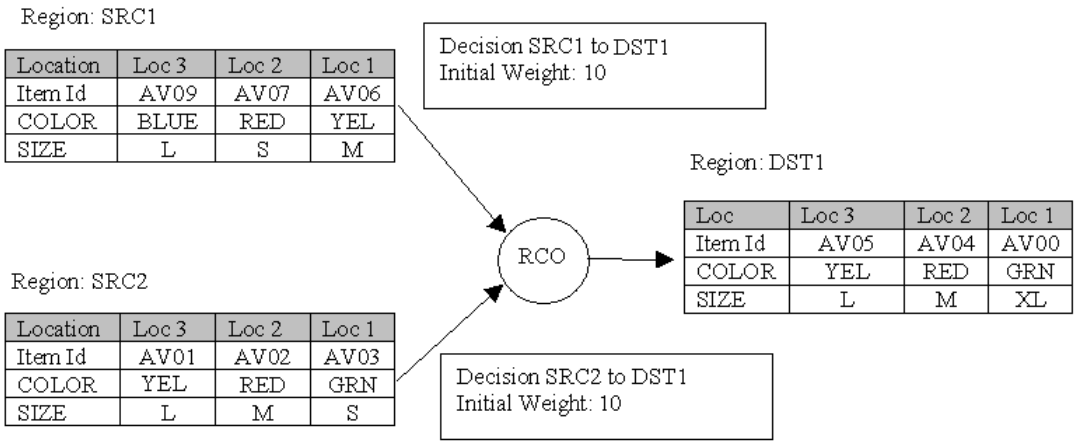
Description

`Select Lowest Order Decision` confirms that a decision made based on the lowest order is valid.

Parameters

This function block has no parameters.

Example


Region: SRC1
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV09 | AV07 | AV06
COLOR | BLUE | RED | YEL
SIZE | L | S | M
Decision SRC1 to DST1
Initial Weight: 10
Region: DST1
Loc | Loc 3 | Loc 2 | Loc 1
Item Id | AV05 | AV04 | AV00
COLOR | YEL | RED | GRN
SIZE | L | M | XL
RCO
Region: SRC2
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV01 | AV02 | AV03
COLOR | YEL | RED | GRN
SIZE | L | M | S
Decision SRC2 to DST1
Initial Weight: 10

1. Decision SRC1 to DST1, has an order of 1. This decision is the lowest order decision that is still possible and therefore is *not* eliminated.
2. Decision SRC2 to DST1, has an order of 2. This decision is not the lowest order decision and therefore is eliminated.

Pseudo Code

```
For each decisions
  If the decision is still possible
    If the decision has the lowest order
      Save the decision offset
    End if
  End if
Next decision
Select the decisions with the Lowest order
Exit Sub
```

See Also

Select Highest Order Decision.

Note: The decision order is determined by its position in the Routing Control Configuration tree.

After this decision executes, the logic script stops.

If all decisions have already been eliminated, the logic script will not terminate.

Select Most Empty Region

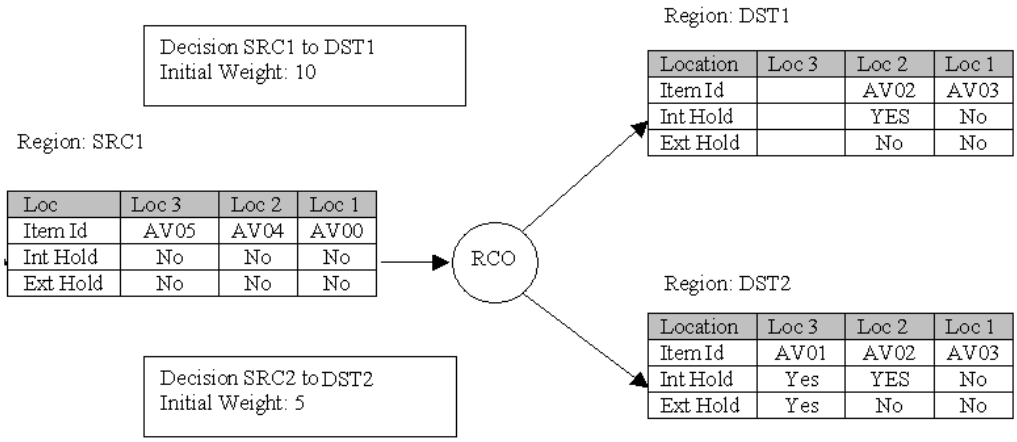
Description

`Select Most Empty Region` confirms that a decision is valid based on the most empty destination region.

Parameters

This function block has no parameters.

Example


Region: DST1
Decision SRC1 to DST1
Initial Weight: 10
Location | Loc 3 | Loc 2 | Loc 1
Item Id | | AV02 | AV03
Int Hold | | YES | No
Ext Hold | | No | No
Region: SRC1
Loc | Loc 3 | Loc 2 | Loc 1
Item Id | AV05 | AV04 | AV00
Int Hold | No | No | No
Ext Hold | No | No | No
RCO
Region: DST2
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV01 | AV02 | AV03
Int Hold | Yes | YES | No
Ext Hold | Yes | No | No
Decision SRC2 to DST2
Initial Weight: 5

1. For decision SRC1 to DST1, destination region has a quantity of 2. Since this destination region has the lowest quantity, the decision is *not* eliminated.
2. For Decision SRC1 to DST2, the destination region has a quantity of 3. Since this destination region does not have the lowest quantity, the decision is eliminated.

Pseudo Code

```
For each decisions
  If the decision is still possible
    If the decision source region has a Quantity point in Region Maintenance
      Get the value of the quantity point
      If the region quantity is less than the min
        Store the decision as the min quantity
      End if
    End if
  End if
Next decision
If found a decision with min quantity
  Select the decision
End if
Exit Sub
```

Note: In the case where multiple decisions have the same destination regions, containing the minimum quantity or when multiple destination regions have the same quantity, the decision with the lowest order is selected.

If all decisions have already been eliminated, the logic script will not terminate.

Select Most Full Region

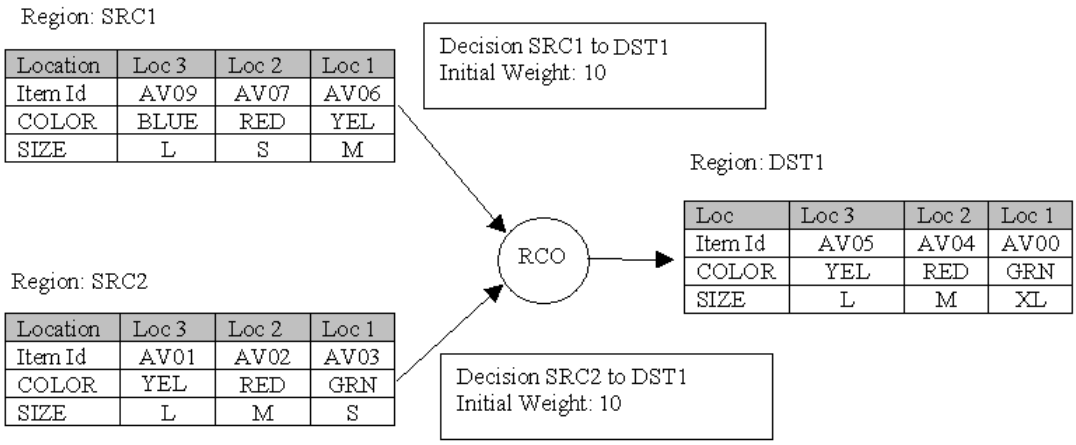
Description

`Select Most Full Region` confirms that a decision is valid based on the most full source region.

Parameters

This function block has no parameters.

Example


Region: SRC1
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV09 | AV07 | AV06
COLOR | BLUE | RED | YEL
SIZE | L | S | M
Decision SRC1 to DST1
Initial Weight: 10
Region: DST1
Loc | Loc 3 | Loc 2 | Loc 1
Item Id | AV05 | AV04 | AV00
COLOR | YEL | RED | GRN
SIZE | L | M | XL
RCO
Region: SRC2
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV01 | AV02 | AV03
COLOR | YEL | RED | GRN
SIZE | L | M | S
Decision SRC2 to DST1
Initial Weight: 10

1. Decision SRC1 to DST1, has a quantity of 2, in its source region.. This is not the source region containing the highest quantity, so eliminate the decision.
2. Decision SRC2 to DST1, has a quantity of 3 in its source region. Since this source region has the highest quantity, the decision is *not* eliminated.

Pseudo Code

```
For each decisions
  If the decision is still possible
    If the decision source region has a Quantity point in Region Maintenance
      Get the value of the quantity point
      If the region quantity is greater than the max
        Store the decision as the max quantity
      End if
    End if
  End if
Next decision
If found a decision with max quantity
  Select the decision
End if
Exit Sub
```

Note: In the case where multiple decisions have the same source region with a maximum quantity or when multiple source regions have the same quantity, the decision with the lowest order is selected.

If all decisions have already been eliminated, the logic script will not terminate.

Select Next Highest Order Decision

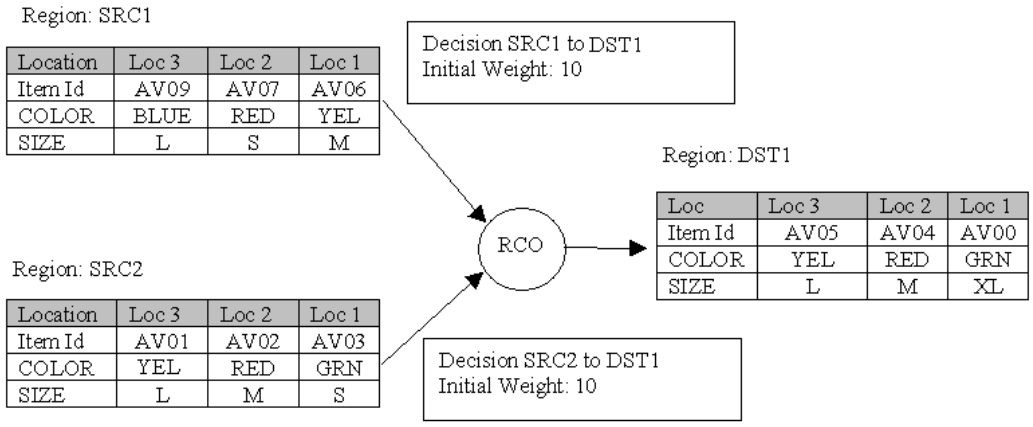
Description

`Select Next Highest Order Decision` confirms that a decision is valid based on the next highest order after the last executed decision.

Parameters

This function block has no parameters.

Example


Region: SRC1
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV09 | AV07 | AV06
COLOR | BLUE | RED | YEL
SIZE | L | S | M
Decision SRC1 to DST1
Initial Weight: 10
Region: DST1
Loc | Loc 3 | Loc 2 | Loc 1
Item Id | AV05 | AV04 | AV00
COLOR | YEL | RED | GRN
SIZE | L | M | XL
RCO
Region: SRC2
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV01 | AV02 | AV03
COLOR | YEL | RED | GRN
SIZE | L | M | S
Decision SRC2 to DST1
Initial Weight: 10

1. The last decision executed was SRC2 to DST1.
2. Since there is no decision with a higher order, so the all decisions but the first decision are eliminated.

Pseudo Code

```
If all decisions have not already been eliminated
  Get order of last decision selected
  If the last decision selected had the highest order
    Set the current decision to the first
  Else
    Set the current decision to the next order
  End if
  While not done
    If current decision has been eliminated
      If the current decision has the highest order
        Set the current decision to the first decision
      Else
        Set the current decision to the next order
      End if
    Else
      Select the current decision
      Set done flag
    End If
  End while
Exit Sub
```

Note: After this block, the logic module terminates.

Select Oldest Item

Description

`Select Oldest Item` confirms that the decision is valid based on the lowest attribute value in its source region.

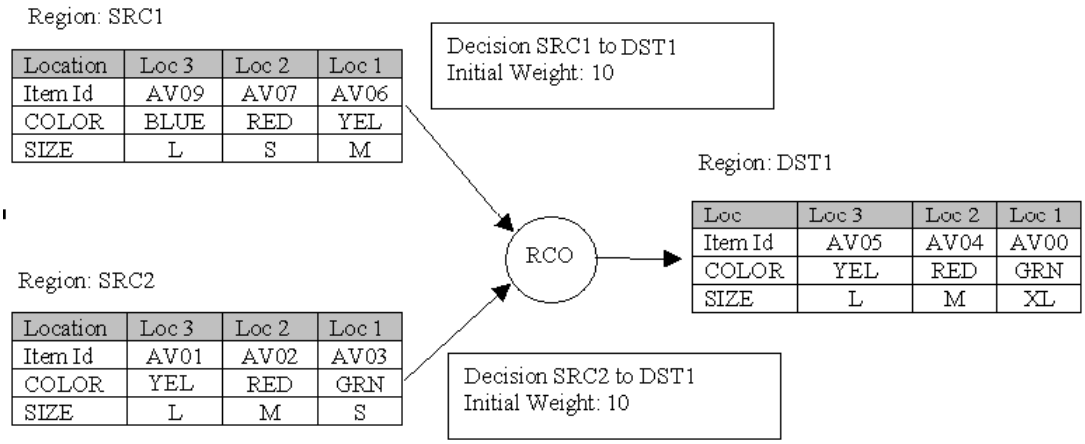
This does not eliminate any other decision.

Parameters

This function block has the following parameters:

Parameter	Description
Item Class	Class of Item to be used in the comparison.
Attribute Name	Name of attribute to be used in comparison.
Start Character	Start character within the attribute value.
Number of Characters	Number of attribute value characters used in the comparison. This allows the operator to use a subsection of the attribute. To use the entire attribute value in the comparison, set this value to 0.

Example


Region: SRC1
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV09 | AV07 | AV06
COLOR | BLUE | RED | YEL
SIZE | L | S | M
Decision SRC1 to DST1
Initial Weight: 10
Region: DST1
Loc | Loc 3 | Loc 2 | Loc 1
Item Id | AV05 | AV04 | AV00
COLOR | YEL | RED | GRN
SIZE | L | M | XL
RCO
Region: SRC2
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV01 | AV02 | AV03
COLOR | YEL | RED | GRN
SIZE | L | M | S
Decision SRC2 to DST1
Initial Weight: 10

Parameter	Value
Item Class	VEHICLE
Attribute Name	COLOR
Start Character	0
Number of Characters	0

1. Decision SRC1 to DST1 has a COLOR Attribute value of YEL. Since this is not the lowest attribute value, the decision is eliminated.
2. Decision SRC2 to DST1 has a COLOR Attribute value of GRN. Since this is the lowest attribute value, the decision is *not* eliminated.

Pseudo Code

```
For each decision
  If the decision is still possible
    Get the specified attribute item
    If item found that matches specified item class
      Get the attribute value
      If attribute was found
        If the present attribute value < the lowest yet
          Set lowest yet to present attribute value
          Store decision offset
        End if
      End if
    End if
  End if
Next decision
If a decision was found with a lowest attribute
  Eliminate all decisions but the one with the lowest attribute
Else
  If we didn't find any items with specified item class
    Eliminate all decisions
  End if
End if
Exit sub
```

Note: If no items of the specified item class are found in any of the decisions source regions, then all decisions will be eliminated.

The Logic module will exit after this block.

Core Function Blocks

Append a Decision in ExtDecBuffer

Description

`Append a Decision in ExtDecBuffer` allows a new decision to be appended in decision buffer in RCO.

Parameters:

This function block has the following parameters:

Parameter	Description
`INPUT`	
Controller	Control location ID of the controller which provided the external decisions. This is used to identify decision buffer in which decisions will be appended.
Decision Name	Name of the decision to be appended.
Decision Attribute	Attribute of decision to be appended.
Req Flag	Request indicator of the decision (0 or 1).
`OUTPUT`	
Status	Status of the call, could be RCO_SUCCESS, RCO_WARNING or RCO_ERROR. If status is not RCO_SUCCESS, error information is returned in Error member of **`RcoDecisionBuffer`** object.

Clear the Cached Items

Description:

`Clear the Cached Items` clears the RCO cache.

Item data for a region location gets cached during the trigger sequence of an RCO site whenever any function requests the item data for that location. If the location data is sought again, it is retrieved from the cache. For each decision, the last item of destination region and the first item of source region are cached by default when the site is triggered.

Parameters:

This function block has no parameters:

Consume a Trigger

Description:

`Consume a Trigger` changes the trigger sequence so that it is again waiting for the first point in the trigger sequence from an undefined state.

Under normal operating procedures, once a site begins execution by a trigger, the trigger sequence is in an undefined state. It is effectively waiting for the next point directly after the last point in the trigger sequence.

Only one trigger sequence per site may be buffered.

Triggers are only buffered if the site has unexpected point processing enabled.

Parameters:

This function block has the following parameter.

Parameter	Description
Trigger Name	Name of the trigger sequence to be consumed. If the parameter is blank, ll triggers are consumed.

Custom Block

Description:

`Custom Block,` which is an advanced function block, inserts custom BCE code into a Logic or Output module.

Parameters:

This function block has the following parameter:

Parameter	Description
Code	Enter BCE code that is to be inserted directly into the module.

Delete at a Decision in ExtDecBuffer

Description:

Delete at a Decision in ExtDecBuffer deletes a decision from the decision buffer. If two or more decisions are in buffer with same offset of the decision, the first decision with that offset is deleted. If no decisions are found with the offset, an error is generated.

The difference between **Delete at a Decision in ExtDecBuffer** and **Delete a Decision in ExtDecBuffer** is that the former takes the offset; the latter takes the name.

Example

The following are the decisions.

Offest	Name
1	Decision Left
2	Decision Right
3	Decision Up
4	Decision Down

Delete a Decision in ExtDecBuffer would take *Decision Right* as a parameter.

Delete at a Decision in ExtDecBuffer would take the offset *2* as the parameter.

The two functions delete the same decision.

Parameters:

This function block has the following parameters:

Parameter	Description
INPUT	
Controller	Control location ID of the controller which provided the external decisions. This is used to identify decision buffer from which decision will be deleted.
Decision Offest	Offest of the decision to be deleted.
OUTPUT	
Status	Status of the call, could be RCO_SUCCESS, RCO_WARNING or RCO_ERROR, If status is not RCO_SUCCESS then error information is returned in Error member of RcoDecisionBuffer object.

Delete a Decision in ExtDecBuffer

Description:

`Delete a Decision in ExtDecBuffer` deletes a decision from the decision buffer. If two or more decisions are in buffer with same name, the first decision with that name is deleted. If no decision are found with the name an error is generated.

The difference between **`Delete at a Decision in ExtDecBuffer`** and **`Delete a Decision in ExtDecBuffer`** is that the former takes the offset; the latter takes the name.

Example

The following are the decisions.

Offest	Name
1	Decision Left
2	Decision Right
3	Decision Up
4	Decision Down

`Delete a Decision in ExtDecBuffer` would take *Decision Right* as a parameter.

`Delete at a Decision in ExtDecBuffer` would take the offset *2* as the parameter.

Parameters:

This function block has the following parameters:

Parameter	Description
`INPUT`	
Controller	Control location ID of the controller which provided the external decisions. This is used to identify decision buffer from which decision will be deleted.
Decision Name	Name of the decision to be deleted.
`OUTPUT`	
Status	Status of the call, could be RCO_SUCCESS, RCO_WARNING or RCO_ERROR, If status is not RCO_SUCCESS then error information is returned in Error member of RcoDecisionBuffer object.

Exit Sub

Description:

`Exit Sub`, an advanced function block, causes a Logic or Output module to exit immediately.

Parameters:

This function block has no parameters.

Fill Array Point

Description:

`Fill Array Point` sets an array point offset with a value or an attribute value.

Parameters:

This function block has the following parameters:

Parameter	Description
Point ID	ID of array point to be updated.
Index	Offset of array point to be updated.
From	Source of the update value. Either Attribute or Value.
Value	If *From* parameter is value, then this is the value to be written to the element.
Region ID	ID of Region where item is located.
Location	Location of the item in the Region.
Item Class	Class of the item.
Attribute ID	ID of Attribute whose value is to be set into the RCO Variable.
Start Character	Starting character within the attribute value.
Length	Number of characters from the attribute value to use. Enter 0 for all.

Fill RCO Array Point

Description:

`Fill RCO Array Point` sets a single element of an array point. The array point is not updated until the Set Array Point function block is executed.

Parameters:

This function block has the following parameters:

Parameter	Description
Point ID	ID of the CIMPLICITY array point, to be updated.
Offset	Offset of the array point to be updated.
Value	Value to be written to the array point. Select an RCO Variable or enter a value.

See Also:

Set Array Point (Function Block)

Flush the ExtDecBuffer

Description:

`Flush the ExtDecBuffer` deletes all the decisions from decision buffer in RCO.

Parameters:

This function block has the following parameters:

Parameter	Description
`INPUT`	
Controller	Control location ID of the controller which provided the external decisions. This is used to identify decision buffer from which decisions will be deleted.
`OUTPUT`	
Status	Status of the call, could be RCO_SUCCESS, RCO_WARNING or RCO_ERROR. If status is not RCO_SUCCESS, error information is returned in Error member of RcoDecisionBuffer object.

Get Decision Attribute

Description:

`Get Decision Attribute` retrieves the name of the user-defined decision attribute.

Parameters:

This function block has no parameters.

Pseudo Code:

Not available for this release.

Return Value:

The value of the user-defined decision attribute. The decision attribute can be set from either an RCO_UI manual trigger, or from the SetDecisionAttribute function block.

See Also:

Set Decision Attribute function block.

Get Decision Status

Description:

`Get Decision Status` gets the current decision status, which will be a string up to 16 characters long.

This is the decision that is currently being selected by the RCO. You cannot change the decision status until a decision has been selected. If no decision has been selected yet (Many decisions still possible) or all decisions have been eliminated (None still possible) then nothing happens when the block is executed.

Parameters:

This function block has no parameters.

Pseudo Code:

Not available for this release.

Return Value:

None

Get Ext Decision List

Description:

`Get Ext Decision List` populates the RcoDecisionBuffer basic object with decision data stored in Decision buffer in RCO. The decisions can be accessed using DecArray(Index) function of RcoDecisionBuffer.

Parameters:

This function block has the following parameters:

Parameter	Description
`INPUT`	
Controller	Control location ID of the controller which provided the external decisions. This is used to identify decision buffer from which decisions will be retrieved.
`OUTPUT`	
Status	Status of the call, could be RCO_SUCCESS, RCO_WARNING or RCO_ERROR. If status is not RCO_SUCCESS, error information is returned in Error member of RcoDecisionBuffer object.

Get Production Data

`Get Production Data` is a reserved function. Consult the factory for use.

Increment Attribute

Description:

`Increment Attribute` increments an attribute by a value.

Parameters:

This function block has the following parameters:

Parameter	Description
Region ID	ID of Region where item is located.
Location	Location of the item in the Region.
Item Class	Class of the item.
Attribute ID	ID of Attribute whose value is to be set into the RCO Variable.
Quantity	Amount to increment the attribute.

Pseudo Code:

```
Get item
If item found
  Get attribute value
  If attribute is found
    Convert the attribute value to numeric
    Add quantity to numeric attribute value
    Write attribute value back to item
  End if
End if
```

See Also:

BCE, Val Function

Note: The attribute value is converted to numeric using the rules of the Basic "Val" function.

The value of the attribute is overwritten with the new value. If the attribute couldn't be converted to a numeric value, then the attribute will be updated with the Quantity value.

Increment Point

Description:

`Increment Point` increments a point by a value.

Parameters:

This function block has the following parameters:

Parameter	Description
Point ID	ID of point to be updated.
Quantity	Amount by which to increment the point. Enter a negative number to decrement the point value.

Insert a Decision in ExtDecBuffer

Description:

`Insert a Decision in ExtDecBuffer` allows a new decision to be inserted in decision buffer in RCO. If index at which decision is required to be inserted is more than size of buffer, it is appended at the end. If index is less than one, it is inserted as first decision.

Parameters:

This function block has the following parameters:

Parameter	Description
`INPUT`	
Controller	Control location ID of the controller which provided the external decisions. This is used to identify decision buffer in which decisions will be inserted.
Decision Name	Name of the decision to be inserted.
Decision Attribute	Attribute of decision to be inserted.
Req Flag	Request indicator of the decision (0 or 1).
Index	Index at which the decision will be inserted.
`OUTPUT`	
Status	Status of the call, could be RCO_SUCCESS, RCO_WARNING or RCO_ERROR, If status is not RCO_SUCCESS, error information is returned in Error member of RcoDecisionBuffer object.

Logstatus Generator

Description:

`LogStatus Generator` writes a message to the CIMPLICITY status log.

Parameters:

This function block has the following parameters:

Parameter	Description
Level	Error level: Success, Warning or Failure.
Procedure Name	Specifies the procedure/module.
Status Message	Text of message to be written to log.
Error Code	Optional error code.
Reference code	Optional Reference Code.
User Value 1	Substituted for the first occurrence of %s in Status Message.
User Value 2	Substituted for the second occurrence of %s in Status Message.
User Value 3	Substituted for the third occurrence of %s in Status Message.
User Value 4	Substituted for the fourth occurrence of %s in Status Message.

Region Full Check

Description:

`Region Full Check` gets the total number of items in a region and in process to that region.

Parameters:

This function block has the following parameters:

Parameter	Description
Region Id	ID of the region to check.
Total Items	Variable to store Total items in the region.
In process Items	Variable to store in process items in the region.

Request External Decisions

Description:

`Request External Decisions` requests the number of decisions from an external process which can provide decisions, the process can be a local process or remote process. The received decisions are stored in a buffer which subsequently provides these decisions to RCO. Moreover, RCO can also append, insert, delete and flush these decisions. This function block uses RcoDecisionBuffer. RequestDecisions call to request decisions. If the call to this function block returns success, then the basic object RcoDecisionBuffer also get refreshed to hold new decisions

Parameters:

This function block has the following parameters:

Parameter	Description
`INPUT`	
Controller	Control location ID of the controller which provides the external decisions. This parameter is used to assign Id to RcoDecisionBuffer object whose RequestDecisions function is called by this function block. For later operations on this buffer, this ID is used to identify the buffer.
Project id/ Process_id	Projectname and Process id combined together using a delimiter '/'. *Project id:* Name of the project in which External process is running and from which decisions are required. *Process _id*: Id of External process from which decisions are required. When double clicked on this parameter, a dialog is displayed to select project and external processes.
Decisions attribute	Attribute of requested decisions [OPTIONAL]
Decisions Required	Number of decisions required from external process
`OUTPUT`	

Status	Status of the call, could be RCO_SUCCESS, RCO_WARNING, RCO_ERROR, If status is not RCO_SUCCESS, error information is returned in Error member of RcoDecisionBuffer object.

Reset a Trigger

Description:

`Reset a Trigger` resets a trigger so it is waiting for the first point in the trigger sequence.

Parameters:

This function block has the following parameters:

`INPUT`

Trigger Name	Name of the trigger or blank for all triggers.

`OUTPUT`

Trigger Sequence(s)	Is reset so it is waiting for the first point again.

Select next External Decision

Description:

`Select next External Decision` retrieves the first decision from the decision buffer and executes it if it is also configured in RCOSite executing this function block. If the decision is not configured in RcoSite, it is not executed and an error is generated . The decision also gets removed from buffer after execution of this function block.

If no decisions are left in decision buffer then error is returned indicating no decisions left in buffer. At this point Request External Decisions function block is required to be executed if more decisions are sought from buffer. However, user can also append/insert decisions using Append and Insert function blocks.

Parameters:

This function block has the following parameters:

Parameter	Description
`INPUT`	
Controller	Control location ID of the controller which provided the external decisions. This is used to identify decision buffer from which decisions will be selected.
`OUTPUT`	
Status	Status of the call, could be RCO_SUCCESS, RCO_WARNING or RCO_ERROR, If status is not RCO_SUCCESS, error information is returned in Error member of RcoDecisionBuffer object.

Set Array Point

Description:

Set Array Point writes the stored array point elements to a CIMPLICITY point.

Parameters:

This function block has the following parameters:

Parameter	Description
Point ID	ID of the array point.
No Set Elements	Specifies what to do with elements that weren't updated. Clear: Non set elements are set to space or zero. Existing:Non set elements are unchanged.

Set Attribute

Set Attribute is obsolete. Use the current function blocks:

- Set Attribute with Attribute,
- Set Attribute with Point and
- Set Attribute with Value.

Set Attribute to Text and Integer

Set Attribute to Text and Integer is obsolete. Use **Set Point with Attribute** instead.

Set Attribute with Attribute

Description:

`Set Attribute with Attribute` updates an attribute value with another attribute value.

Parameters:

This function block has the following parameters:

Parameter	Description
Destination Region ID	ID of Region where item is located.
Destination Location	Location of the item in the Region.
Destination Item Class	Class of the item.
Destination Attribute ID	ID of Attribute whose value is to be set.
Source Region ID	ID of Region where item is located.
Source Location	Location of the item in the Region.
Source Item Class	Class of the item.
Source Attribute ID	ID of Attribute whose value is to be used to set the *Destination Attribute ID*.
Source Attribute Start Char	Specify the start character if setting a substring of the source Attribute.
Source Attribute Length	Specify the number of characters to set starting from *Source Attribute Start Char*.

Pseudo Code:

```
Read source attribute value
If attribute is found
  Read destination attribute
  If attribute is found
    Update destination attribute value with the source attribute value.
  End if
End if
```

Set Attribute with Point

Description:

Set Attribute with Point writes a point value to an attribute value.

Parameters:

This function block has the following parameters:

Parameter	Description
Region ID	ID of Region where item is located.
Location	Location of the item in the Region.
Item Class	Class of the item.
Attribute ID	ID of Attribute whose value is to be set.
Point ID	Point ID whose value is written to the specified attribute.

Set Attribute with RCO Variable

Set Attribute with RCO Variable is obsolete. Use **Set Attribute with Value**.

Set Attribute with Value

Description:

Set Attribute with Value updates an attribute with a value.

Parameters:

This function block has the following parameters:

Parameter	Description
Region ID	ID of Region where item is located.
Location	Location of the item in the Region.
Item Class	Class of the item.
Attribute ID	ID of Attribute whose value is to be set.
Value	Value or RCO Variable which is written to the specified attribute.

Set Auto-trigger Interval

Description:

Set Auto-Trigger Interval changes the timed trigger interval. This controls the elapse time in seconds, since the last trigger, before a site will automatically trigger.

Parameters:

This function block has the following parameters:

Parameter	Description
New Interval	Select Disable or enter a new interval.

Set Decision Attribute

Description:

`Set Decision Attribute` sets the default decision attribute, which can hold a 32-character string defined by the user.

Parameters:

This function block has the following parameters:

Parameter	Description
Value	User define 32-character string. Value can be typed in or can be set from an RCO Variable.

Pseudo Code:

Not available for this release.

Return Value:

None.

Set Decision Status

Description:

`Set Decision Status` sets the current decision status, which can hold a 16-character string defined by the user.

This is the decision that is currently being selected by the RCO. You cannot change the decision status until a decision has been selected. If no decision has been selected (Many decisions still possible) or all decisions have been eliminated (None still possible) then nothing happens when the block is executed.

Note: The decision status is displayed in the RCO_UI decision history list.

Parameters:

This function block has the following parameters:

Parameter	Description
Value	User defined 16-character string. Value can be typed in or can be set from an RCO Variable.

Pseudo Code:

Not available for this release.

Return Value:

None.

Set Point with Attribute

Description:

`Set Point with Attribute` writes attribute value to CIMPLICITY point.

Parameters:

This function block has the following parameters:

Parameter	Description
Point ID	ID of point to be updated with attribute value.
Array Offset	Array offset of point, select "No Array" if point is not an array.
Region ID	ID of Region where item is located.
Location	Location of the item in the Region.
Item Class	Class of the item.
Attribute ID	ID of Attribute whose value is to be set into the RCO Variable.
Start Character	Starting character within the attribute value.
Attribute Length	Ending character within the attribute value. Specify 0 for the entire attribute.

Pseudo Code:

```
Read Attribute Value
Write attribute value to point
```

Set Point with Point

Description:

`Set Point with Point` sets a point with the value of another point.

Parameters:

This function block has the following parameters:

Parameter	Description
Point ID	Destination point ID.
Array Offset	Array offset of destination point to be set.
Point ID	Source point ID.
Array Offset	Array offset of source point to be read.

Pseudo Code:

```
Read point value
Write point value to destination point
```

Set Point with Timestamp

Description:

`Set Point with Timestamp` sets a point with the current time.

Parameters:

This function block has the following parameters:

Parameter	Description
Parameter	Description
Point ID	Point to be updated.
Format	Format of the time stamp to be written to the point.

Pseudo Code:

```
Get current time
Write current time to specified point
```

Set Point with Value

Description:

`Set Point with Value` writes a value to a CIMPLICITY point.

Parameters:

This function block has the following parameters:

Parameter	Description
Point ID	ID of point to be updated.
Value	Value or RCO Variable to be written to the point.

Set RCO Variable with Attribute

Description:

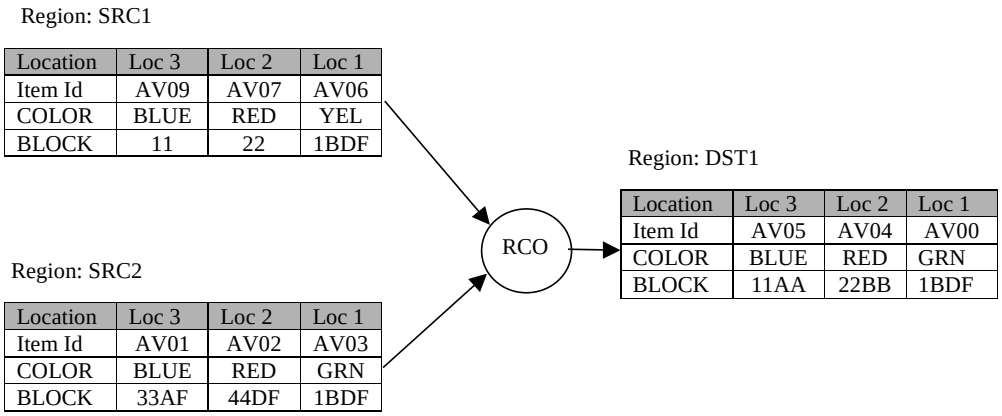
`Set RCO Variable with Attribute` sets an RCO variable with attribute value.

Parameters:

This function block has the following parameters:

Parameter	Description
RCO Variable	RCO Variable to be updated.
Region ID	ID of Region where item is located.
Location	Location of the item in the Region.
Item Class	Class of the item.
Attribute ID	ID of Attribute whose value is to be set into the RCO Variable.
Start Character	Starting character within the attribute value.
Attribute Length	Ending character within the attribute value. Specify 0 for the entire attribute.
Conversion	Specifies the type of conversion to perform on the attribute. RCO Variables are **`Variant`** variables. They can be any type, depending on the value assigned. Conversion Type **`String`** means the value is stored in the RCO Variable as a string. The other conversion types store the value in the RCO Variable as an Integer.

Example


Region: SRC1
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV09 | AV07 | AV06
COLOR | BLUE | RED | YEL
BLOCK | 11 | 22 | 1BDF
Region: SRC2
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV01 | AV02 | AV03
COLOR | BLUE | RED | GRN
BLOCK | 33AF | 44DF | 1BDF
RCO
Region: DST1
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV05 | AV04 | AV00
COLOR | BLUE | RED | GRN
BLOCK | 11AA | 22BB | 1BDF

Parameter	Value
RCO Variable	`RCO Variable 1`
Region ID	`SRC1`
Location	`1`
Item Class	`Thing`
Attribute ID	`BLOCK`
Start Character	`0`
Attribute Length	`0`
Conversion	`HEX`

1. Value of attribute “BLOCK” is a string “1BDF” which is the hexadecimal representation of 7135
2. The value stored in *RCO Variable 1*, after the conversion is, 7135 (base 10).

Note: This function uses the Basic PRT Extensions, not the internal RCO Extensions. The PRT information is not retrieved from the Cache, but is gotten directly from PRT.

Set RCO Variable with Expression

Description:

`Set RCO Variable with Expression` sets the specified RCO variable to the basic expression given in the value parameter.

Parameters:

This function block has the following parameters:

Parameter	Description
Variable	Specifies what variable to set.
Value	The Basic Expression to be assigned to the specified RCO Variable.

Pseudo Code:

```
Set RCOVar# to Value
```

Note: The value must be a valid Basic Expression.

Set RCO Variable with Point

Description:

`Set RCO Variable with Point` sets an RCO Variable with a point value.

Parameters:

This function block has the following parameters:

Parameter	Description
Point ID	ID of Point to be used to set RCO variable.
Array Element or Variable	If point is an array, specify array offset or a RCO Variable containing the array element.
RCO Variable	The RCO Variable to be updated.

See Also:

Set RCO Variable with Point Value.

Set RCO Variable with a Special Value

Set RCO Variable with a Special Value is called in a script to set a state or error flag that can be accessed in another script.

INPUT

Use one of the following names of the RCO variable.

Name	Description
Decision Count	Count of decisions in decision list.
Error Flag	VBA Error Flag
Error Class	VBA Error Class
Error Code	VBA Error Code
Error Message	VBA Error Message
Error Source Type	VBA Error Source Type
Error Source Name	VBA Error Source Name
Script Type Logic	Constant specifying a script type of logical module.
Script Type Output	Constant specifying a script type of output module.
Script Type None	Constant specifying a script type of No decisions remaining.
Script Type Many	Constant specifying a script type of many decision remaining.
Script Type Single	Constant specifying a script type of 1 decision remaining.
Point Error: General	General point error.
PRT Error: General	General Tracking Error
PRT Error: No Attrib	Tracking error attribute not found.
PRT Error: No Item	Tracking error Item not found.

Set RCO Variable with Timestamp

Description:

Set RCO Variable with Timestamp sets an RCO variable with the current time.

Parameters:

This function block has the following parameters:

Parameter	Description
Parameter	Description
RCO Variable	RCO Variable to be updated.
Format	Format of the time stamp to be written to the RCO Variable.

Set RCO Variable with Translate Value

Description:

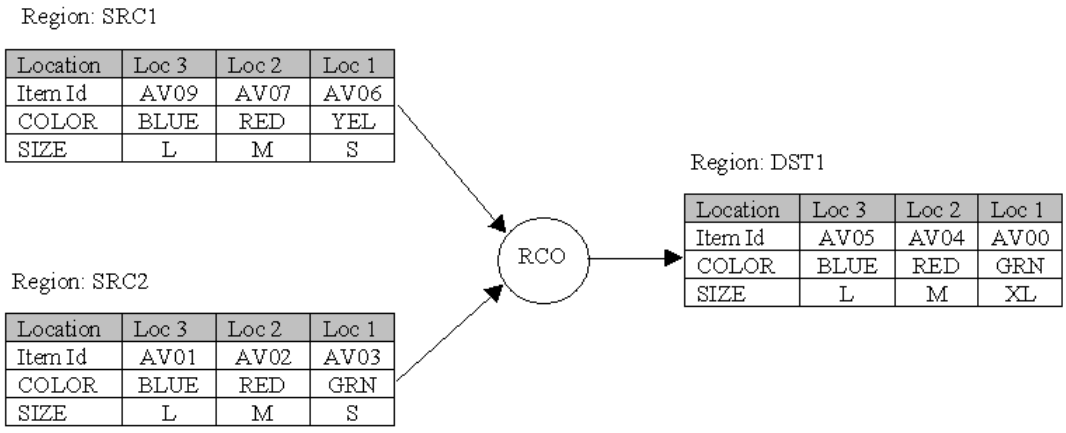
`Set RCO Variable with Translate Value` scans an array for a value and assign the value's offset to a RCO Variable Parameters.

Parameters:

This function block has the following parameters:

Parameter	Description
Point ID	ID of array point to be scanned.
Search Text	Specifies the text to search for in the array point.
RCO Variable	Specifies what variable to set with the offset of the search text in the array point.

Example


Region: SRC1
Location Loc 3 Loc 2 Loc 1
Item Id AV09 AV07 AV06
COLOR BLUE RED YEL
SIZE L M S
Region: SRC2
Location Loc 3 Loc 2 Loc 1
Item Id AV01 AV02 AV03
COLOR BLUE RED GRN
SIZE L M S
RCO
Region: DST1
Location Loc 3 Loc 2 Loc 1
Item Id AV05 AV04 AV00
COLOR BLUE RED GRN
SIZE L M XL

Point Offset	Value
0	YELLOW
1	BLUE
2	GREEN

Parameter	Value
Point ID	ARRAY_POINT_ID
Search Text	GREEN
RCO Variable	RCO Variable 1

Value of RCO Variable 1 after function block is executed, 2.

Pseudo Code:

```
Read point
For each element in the array point
  Get String Representation
  If current array offset = search text
    Store offset
    Break out of loop
  End if
Next Element
Return offset
```

Note: Comparison is case insensitive.

Set RCO Variable with Value (Extended)

Description:

`Set RCO Variable with Value (Extended)` sets an RCO variable with a user-specified value or another RCO Variable. The block allows substrings to be copied.)

Parameters:

This function block has the following parameters:

Parameter	Description
Destination Variable	The RCO Variable to be updated.
Offset	Specifies the offset of the substring in the destination.
Length	Specifies the length of the substring of the destination.
Value	This value or RCO Variable is assigned to the destination RCO Variable.
Length	Specifies the length of the substring of the source.

Set RCO Variable with Value

Description:

`Set RCO Variable with Value` sets an RCO variable with a user specified value.

Parameters:

This function block has the following parameters:

Parameter	Description
RCO Variable	The RCO Variable to be updated.
Value	New value to be stored in the RCO Variable.

Set Wait Encountered Flag

Description:

`Set Wait Encountered Flag` sets a flag to cause routing control to run the wait decision.

Parameters:

This function block has no parameters.

Output Blocks

Attribute Counts

Description:

`Attribute Counts` provide attribute counts by region. Given an array of Regions and Attributes, count the number of items in the region and update a point value with the count. This can be run from any output module or logic module.

Parameters:

This function block has the following parameter:

Parameter	Description
Region ID	Region ID of item.
Location	Location in region to use. If this value is `All`, then all items in the region will be dumped and copied.
Attribute Name	Name of the array point that lists the attribute that will be compared (Compare value(s) of the corresponding element in the *Attribute Value* array Point to the attribute value of the head item for each of the source regions).
Attribute Value	Attribute value(s). Each element in the array can contain one or multiple values with a comma separator. Do not include quotes. **Example** element 0 = **`1 ton,3/4 ton`** element 1 = **`K`**
Attribute Counts	The number of jobs released since a job with the corresponding attribute value was released.

Example

Following are the Region configurations.

Region: ELPO_1

Location	Item Class	Engine	Diesel
1	Vehicle	L05	1 Ton
2	Vehicle	L05	1 Ton
3	Vehicle	L05	2 Ton
4	Vehicle	L09	2 Ton
5	Vehicle	L07	½ Ton
6	Vehicle	L08	¾ Ton

Region: ELPO_2

Location	Item Class	Diesel	Color
1	Vehicle	1 Ton	RED
2	Vehicle	1 Ton	BLUE
3	Vehicle	2 Ton	GREEN
4	Vehicle	2 Ton	WHITE
5	Vehicle	½ Ton	WHITE
6	Vehicle	½ Ton	BLUE

Run the new function block with the following Array Point Values.

Region ID Array	Item Class Array	Attribute Name Array	Attribute Value Array	Count Point ID Array
ELPO_1	Vehicle	ENGINE	L09,L05	CNT_ENGINE
ELPO_1	Vehicle	DIESEL	1 Ton,1/2 Ton	CNT_SIZE
ELPO_2	Vehicle	COLOR	RED	CNT_RED
ELPO_2	Vehicle	COLOR	WHITE	CNT_WHITE

After the function block completes the point value will be as follows:

Point ID	Value
CNT_ENGINE	4
CNT_SIZE	4
CNT_RED	1
CNT_WHITE	2

Pseudo Code

```
For each element in the Region Array point
  Dump the Region listed in the element in Region ID Array
  Set counter to 0
  For each item in Region that matches the current element in Item Class Array
    If (the element has an Attribute matching the current
      element in the Attribute Name Array) than
      If (the attribute value matches the current element in the
          Attribute Value Array) than
        Increment Counter
      End if
    End if
    Next item
  Get the point id of the current element in Count Point ID Array Point
  Set the point value to the counter
Next Region
```

Conditional Alarm with Attribute

Description:

`Conditional Alarm with Attribute` is a group function block to generate an alarm based on a comparison of an attribute value to a RCO Variable.

See Also

Set RCO Variable with Attribute (Function Block)

Set RCO Variable with Value. (Function Block)

Set RCO Variable with Value. (Function Block)

Set RCO Variable with Value. (Function Block)

Set RCO Variable with Value. (Function Block)

Generate Alarm

Conditional Alarm with Point

Description:

`Conditional Alarm with Point` is a group function block to generate an alarm based on a comparison of a point value to an RCO Variable.

Parameters:

This function block has no parameters.

See Also

Set RCO Variable with Point (Function Block)

Set RCO Variable with Value. (Function Block)

Set RCO Variable with Value. (Function Block)

Set RCO Variable with Value. (Function Block)

Set RCO Variable with Value. (Function Block)

Generate Alarm

Generate Alarm

Description:

`Generate Alarm` geneerates a CIMPLICITY ALARM

Parameters:

This function block has the following parameter:

Parameter	Description
Alarm Name	The id of the Alarm. Must be a valid alarm of type $CIMBASIC.
Project ID	The project to generate the alarm on. An empty string "" indicates the current project.
Resource ID	Resource ID to generate the alarm against. Used to control routing of the alarm.
UserId	String (optional). The User ID which generated the alarm.
Reference ID	String (optional). A Reference ID used to distinguish two identical alarms.
Alarm Message	Message for the alarm use "%s" for the parameters.
User Value	A user defined value to be inserted into the alarm message.
User Value	A user defined value to be inserted into the alarm message.
User Value	A user defined value to be inserted into the alarm message.
User Value	A user defined value to be inserted into the alarm message.

Process Bits & Words

Description:

`Process Bits $ Words` populates an RCO Variable with an Attribute value, convert the attribute as requested, and write the converted value to a point.

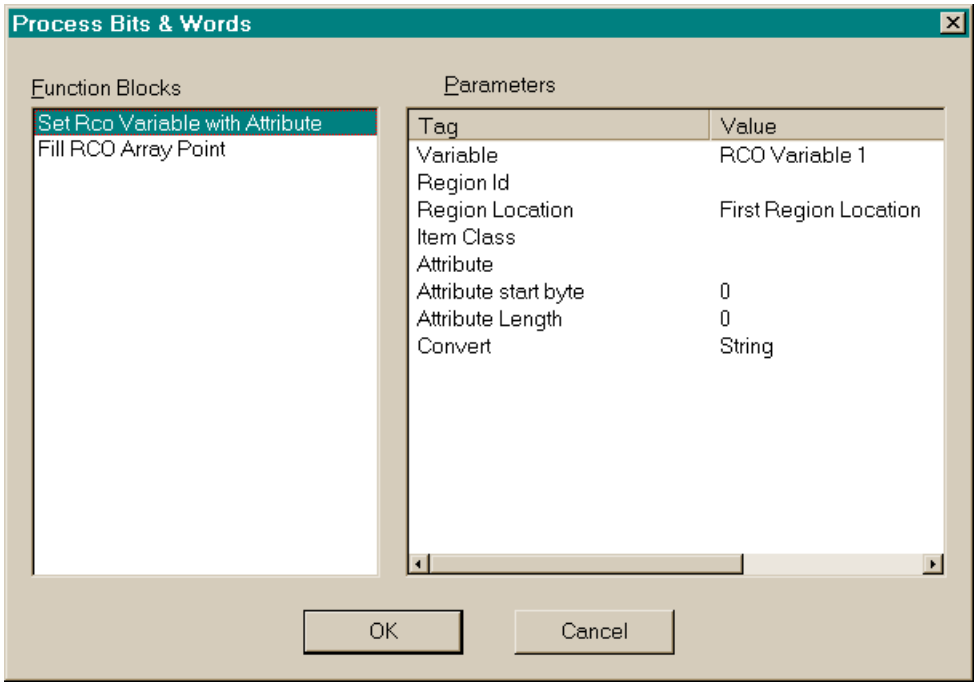
This function block is a group function block. It consists of two existing function blocks, *Set RCO Variable with Attribute Value* and *Set RCO Array Point*. These two blocks are treated like they are separate blocks, except there is a special data entry screen used to collect the data and treat the blocks as a single entity.

Parameters:

This function block has no parameters.

Example

Following is a Data Entry Screen example.



Set Asynch Validation Value

Description:

`Set Asynch Validation Value` sets the value to be checked of Validation point for asynchronous validation of a decision. This value holds good for the decision in which it is specified and for that particular cycle. This function block will be used in output module of decision for which the value is to be set.

Parameters:

This function block has the following parameters:

Parameter	Description
Async Validation Value	Value to be checked. This can be specified using a RCO variable or the value directly.

Update Counts

Description:

`Update Counts`, for the attributes of the vehicle associated with the source region for the executed decision, increments the Group Count Array Point and the total release count.

If the routed Item's attribute value matches the parsed value (from the Attribute Value array point) corresponding to the attribute name (from the Attribute Name array point), the Spacing Count and the Attribute Released Count elements will be incremented by 1.

Parameters:

This function block has the following parameters:

Parameter	Description
Region ID	Region ID of item.
Location	Location in region to use. If this value is `All`, then all items in the region will be dumped and copied.
Item Class	Class of the item that contains the attribute. Blank will specify all items at the region.
Rule Type	Type of elimination to be performed. G: Grouping. Eliminate if the count exceeds or equals the Rule. S: Spacing. Eliminate if the count is less then the rule. P: Percentage rule.
Attribute Name	Name of the array point that lists the attribute names to be compared. Compare value(s) of the corresponding element in the attribute value array point to the attribute value of the head item for each of the source regions.
Attribute Value	Name of array points that lists the Attribute value(s). Each element can contain one or multiple values with a comma separator. Do not include quotes. For example: Element 0 = `1 ton,3/4 ton` Element 1 = **`K`** *Rule* The number of jobs. (Grouping and Spacing Rules)
Count	The number of jobs released. (Grouping and Spacing Rules)
Attribute Released Count	The actual number of vehicles released from the bank with the corresponding attribute value. (Percentage Rule Only)
Total Released Count	A counter point containing the total number of jobs released from the bank (Percentage Rule)

Pseudo Code

```
                    For each array element
         { \\ start for each element in array element
     Get attribute name,  Get attribute value,  Get Item Class
If attribute name and value are not blank
   { \\ start if attribute name and value are not blank.
       If( Location == All)
      {
         for each locations\\ ( nLocCnt = 1 to MaxLocation)
          {
       Call  function UpdateRuleCounters( attrib name, attrib value,
Count (group/spacing) array point[P6],  item class,   rule count array point[P7],
       region id, nLocCnt,  attb name array point, attb val array pt, Rule type
       array point[P8],Attrib count array point[P9],Total release count[P10],
                                  array index)
           }\\endfor all locations
      }\\endif all location
      else \\ for head location
      {

       Call  function UpdateRuleCounters( attrib name, attrib value,
Count (group/spacing) array point[P6],  item class,   rule count array point[P7],
       region id,  Location,  attb name array point, attb val array pt, Rule type
       array point[P8],Attrib count array point[P9],Total release count[P10],
                                  array index)

      }

                               }//endiif atrribute value and name are blank
                     }//end for – next array element

               Update array Points Counts
```

This is a function iteratively called within Update Rule Counts function block.

Function - UpdateRuleCounters – Pseudo Code (this function is called in Update Rule Counts function block)

```
Get the items at the decisions  location (value passed in)
           If (number of items at head > 0)
            { \\ start if items > 0
               For each item in head location
                { \\ start for each item in location
                     Get the attribute value
       if(rule type is group)
       {
                  If (the attribute was found and  the attribute values match)
                            {
                       Increment group count[P6].
                  }
                  else
                  {
                      group count[P6] = 0;

                  }
       }\\endif rule type group
       else if(rule type is Spacing)
       {
                  If (the attribute was found and  the attribute values match)
                            {
                      Spacing count[P6] = 0;
                  }
                  else
                  {
                       Increment Spacing count[P6].

                  }

       }\\endif rule type spacing

        if (Attribute count point and total release count are configured)
       {
                  If (the attribute was found and  the attribute values match)
                            {
                      Increment Attribute count[P9].
                  }

                                                                              Increment
       total release count[P10].

       }

                                                        }\\end for each item in head
       location
                                          }\\endif number of items at head > 0
```

Update Spacing, Attribute and Total Released Counts

Description:

For the attributes of the vehicle associated with the source region for the executed decision increment the Spacing Count Array Point, the Attribute Released Count, and the Total Vehicles Released Count.

If the routed Item's attribute value matches the parsed value (from the Attribute Value array point) corresponding to the attribute name (from the Attribute Name array point), the Spacing Count and the Attribute Released Count elements will be incremented by 1. The Total Released Count will be incremented. Since a decision has been made, the weights will be reset to 0.

Parameters:

This function block has the following parameter:

Parameter	Description
Region ID	Region ID of item.
Location	Location in region to use. If this value is `All`, then all items in the region will be dumped and copied.
Attribute Name	Name of the array point that lists the attribute that will be compared (Compare value(s) of the corresponding element in the *Attribute Value* array Point to the attribute value of the head item for each of the source regions).
Attribute Value	Attribute value(s). Each element in the array can contain one or multiple values with a comma separator. Do not include quotes. For example: element 0 = 1 ton,3/4 ton element 1 = **K**
Spacing Count	The number of jobs released since a job with the corresponding attribute value was released.
Attribute Release Count	The actual number of the vehicles released from the Bank with the corresponding attribute.
Total Released Count	A counter point of the total number of jobs released from the Bank.

Conditional Function Blocks

Case Block

Description:

A BCE **`Case`** clause of a **`Select …. Case`** statement. The function blocks following this block, and preceding the next **`Case, Case Else`** or **`End Select`** block, are executed if the expression in the block evaluates to true.

Parameters:

This function block has the following parameter:

Parameter	Description
Expression	A comma separated list of expressions to be compared against test expression, from the **`Select`** case clause, using any of the following syntaxes: *expression [,expression]* *expression to expression* *is rational_operator expression* The resultant type of the expression in expression list must be the same as that of the test expression.

See also:

CIMPLICITY Basic Control Engine Language Reference (GFK-1283)

Select…Case (statement)

Select Block (Function Block)

Case Else Block (Function Block)

Case Else Block

Description:

A BCE **`Case Else`** clause of a **`Select …. Case`** statement. The function blocks following this block and preceding the **`End Select`** block are executed if no other expression in the block are evaluated to true.

Parameters:

This function block has no parameters.

See also:

CIMPLICITY Basic Control Engine Language Reference (GFK-1283)

Select…Case (statement)

Select Block (Function Block)

Case Else Block (Function Block)

Check all Region's (related to Decisions) Status (Extended)

Description:

Expression block used in the Conditional Blocks. This block will perform a comparison of region status bits. The user can specify whether to use the decision source or destination flag.

Parameters:

This function block has the following parameters:

Parameter	Description
Combine with	Used when combining multiple Expression blocks. Defines the Boolean operation to be performed with each Expression Block.
Status To Check	Region status to be checked
Condition	All Regions Set, Some Regions Set, or No Regions Set.
Region Type	Check each Decision based on 'SOURCE', 'DEST' or 'SPECIFY' region.
Region ID	Region ID if 'SPECIFY' given in Region Type.

Pseudo Code

```
If the condition is Some regions are set
  Set return value to false
Else
  Set return value to true
End if
RCOGetDecisionList
For each decision
  If using source region
    Set region id to current decision source region
  Elseif using specify region
    Set region id to region specified in ‘Region ID’
  Elseif using destination region
    Set Region id to current decision destination region
  End if
  Select Case the Condition
    Case "ALL Regions Set"
      If the specified status bit is not set
        Set return value to False
        Exit For
      End If
  Case Some Regions set
    If the specified status bit is Set
      Set return value to True
      Exit For
    End If
  Case "No regions Set"
    If specified status bit is Set
      Set return value to False
      Exit For
    End If
  End Select
Next Decision
```

Check all Region's (related to Decisions) Status

Description:

Expression block used in the Conditional Blocks. This block will perform a comparison of region status bits. The user can specify whether to use the decision source or destination flag.

Parameters:

This function block has the following parameters:

Parameter	Description
Combine with	Used when combining multiple Expression blocks. Defines the Boolean operation to be performed with each Expression Block.
Status To Check	Region status to be checked.
Condition	All Regions Set, Some Regions Set, or No Regions Set.
Region Type	Check each Decision Source or Destination region.

Pseudo Code

```
If the condition is No regions are set
  Set return value to false
Else
  Set return value to true
End if
RCOGetDecisionList
For each decision
  If using source region
    Set region id to current decision source region
  Else
    Set Region id to current decision destination region
  End if
  Select Case the Condition
    Case "ALL Regions Set"
      If the specified status bit is not set
        Set return value to False
        Exit For
      End If
  Case Some Regions set
    If the specified status bit is Set
      Set return value to True
      Exit For
    End If
  Case "No regions Set"
    If specified status bit is Set
      Set return value to False
      Exit For
    End If
  End Select
Next Decision
```

See also:

If (Expression)

Check if any Source Region has Decision

Description:

Returns true if any of the decision's source regions have their 'Waiting For Decision' flag cleared, while the 'Head Item Valid' flag is set.

Parameters:

This function block has the following parameter:

Parameter	Description
Combine with	Used when combining multiple expression blocks. Defines the Boolean operation to be performed with each expression block.

Pseudo Code

```
For All Source Regions of Possible Decisions
  If 'Head Item valid' Flag is set And 'Waiting For Decision' Flag is not set
    Return TRUE
  End If
Next
Return FALSE
```

See also:

Eliminate Decisions Based on Region Status.

Set Source Region as Decision Made.

Note: This function block should be used before 'Eliminate Decisions Based on Region Status' function block to operate properly.

Compare Attribute

`Compare Attribute` is obsolete. Use the current function blocks:

- `Compare Attribute with Attribute`,
- `Compare Attribute with Point` and
- `Compare Attribute with Value`.

Compare Attribute with Attribute

Description:

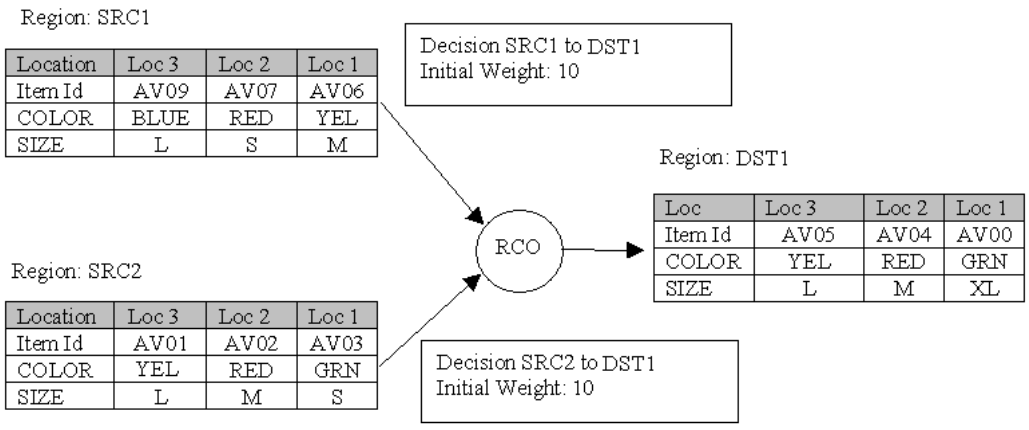
Expression block which compares two attributes. If the attributes meet the comparison criteria, then the condition evaluates to true.

Parameters:

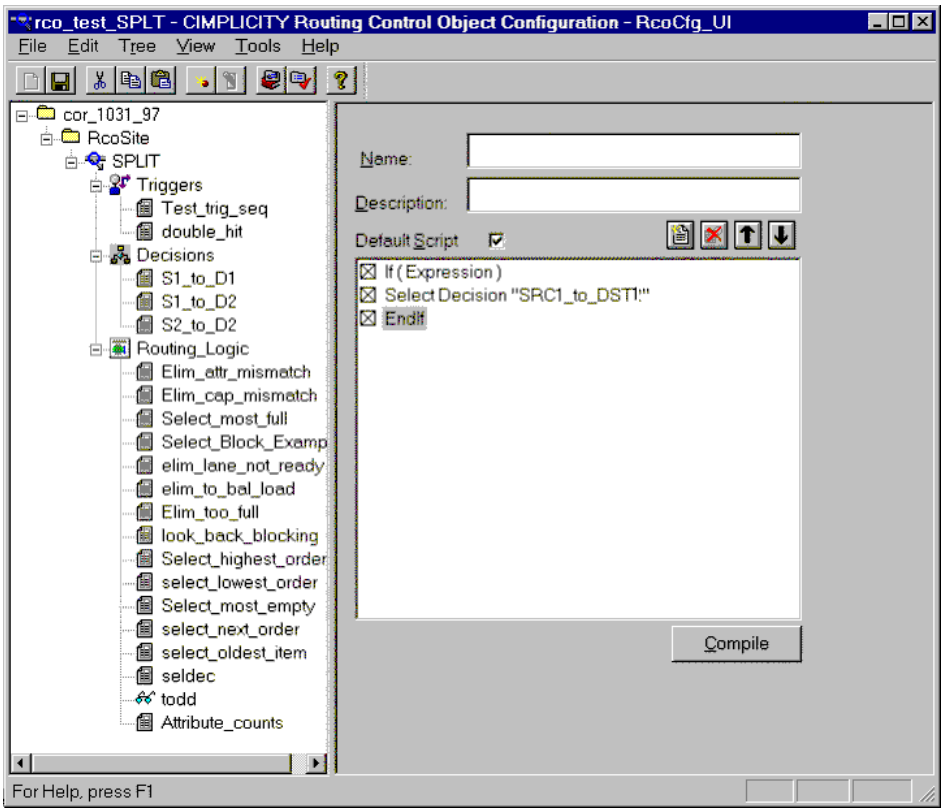
This function block has the following parameters:

Parameter	Description
Combine with	Used when combining multiple Expression blocks. Defines the Boolean operation to be performed with each Expression Block.
Region ID	ID of Region where item is located.
Location	Location of the item in the Region.
Item Class	Class of the item.
Attribute ID	ID of Attribute whose value is to compared.
Start Character	Starting character within the attribute value.
Attribute Length	Number of charcters of attribute to compare. Specify 0 for the entire attribute.
Comparison Operator	Type of Comparison - Greater Than, Less Than, Equals.
Region ID	ID of Region where item is located.
Location	Location of the item in the Region.
Item Class	Class of the item.
Attribute ID	ID of Attribute whose value is to be compared.
Start Character	Starting character within the attribute value.
Attribute Length	Number of charcters of attribute to compare Specify 0 for the entire attribute.
Comparison Type	Numeric or alphanumeric comparison. If numeric comparison is selected, values are converted to integers before comparison.

Example


Region: SRC1
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV09 | AV07 | AV06
COLOR | BLUE | RED | YEL
SIZE | L | S | M
Decision SRC1 to DST1
Initial Weight: 10
Region: DST1
Loc | Loc 3 | Loc 2 | Loc 1
Item Id | AV05 | AV04 | AV00
COLOR | YEL | RED | GRN
SIZE | L | M | XL
RCO
Region: SRC2
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV01 | AV02 | AV03
COLOR | YEL | RED | GRN
SIZE | L | M | S
Decision SRC2 to DST1
Initial Weight: 10

Parameter	Value
Combine with	
Region ID	SRC1
Location	1
Item Class	VEHICLE
Attribute ID	COLOR
Start Character	0
Attribute Length	0
Comparison Operator	Equals
Region ID	DST1
Location	PRT_LAST
Item Class	VEHICLE
Attribute ID	COLOR
Start Character	0
Attribute Length	0
Comparison Type	Alphanumeric



The above function block uses Compare Attribute to Attribute, with the specified parameters.

Since the head location of region SRC1 is YEL and the tail location of DST1 is YEL and the configured comparison operator is Equals, the if statement will evaluate to true and decision SRC1_to_DST1 is *selected*.

See also:

If (Expression)

Compare Attribute with Point

Description:

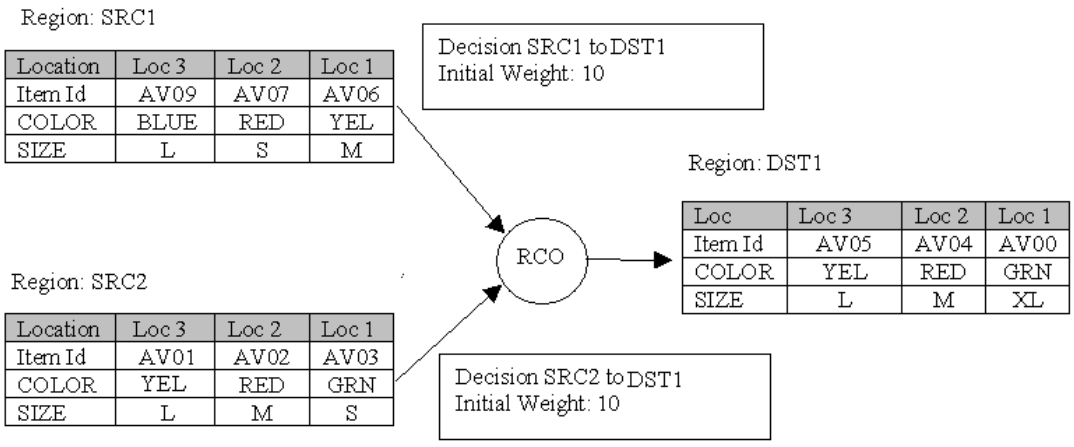
Expression Block which compares an attribute value to a point value. If the two values meet the comparison criteria, then the condition is considered true.

Parameters:

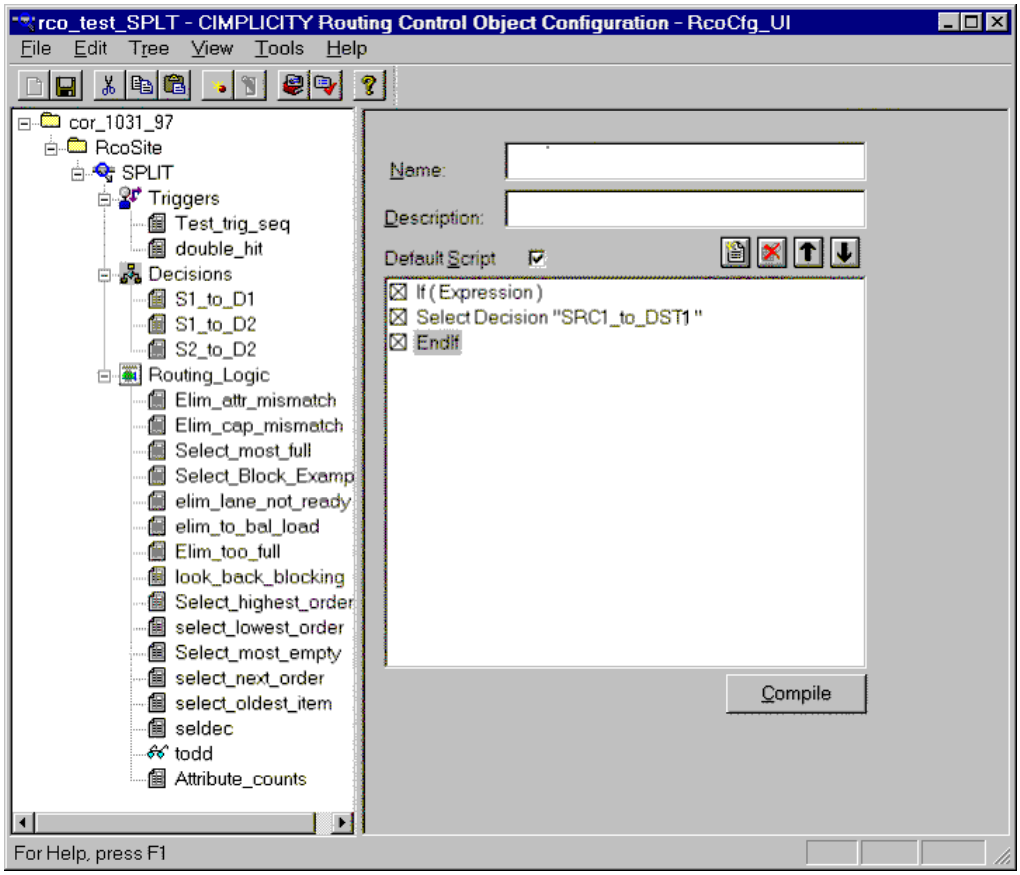
This function block has the following parameters:

Parameter	Description
Combine with	Used when combining multiple expression blocks. Defines the Boolean operation to be performed with each Expression Block.
Region ID	ID of region where item is located.
Location	Location of the item in the Region.
Item Class	Class of the item.
Attribute ID	ID of attribute whose value is to be compared.
Start Character	Starting character within the attribute value.
Attribute Length	Number of charcters of attribute to compare. Specify 0 for the entire attribute.
Comparison Operator	Type of Comparison - Greater Than, Less Than, Equals.
Point ID	ID of CIMPLCITY point whose value is compared to the attribute.
Comparison Type	Numeric or alphanumeric comparison. If numeric comparison is selected, values are converted to integers before comparison.

Example


Region: SRC1
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV09 | AV07 | AV06
COLOR | BLUE | RED | YEL
SIZE | L | S | M
Decision SRC1 to DST1
Initial Weight: 10
Region: DST1
Loc | Loc 3 | Loc 2 | Loc 1
Item Id | AV05 | AV04 | AV00
COLOR | YEL | RED | GRN
SIZE | L | M | XL
RCO
Region: SRC2
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV01 | AV02 | AV03
COLOR | YEL | RED | GRN
SIZE | L | M | S
Decision SRC2 to DST1
Initial Weight: 10

Parameter	Value
Combine with	
Region ID	SRC1
Location	1
Item Class	VEHICLE
Attribute ID	COLOR
Start Character	0
Attribute Length	0
Comparison Operator	Equals
Point ID	COMPARE_POINT
Comparison Type	Alphanumeric



The above function block uses Compare Attribute to Point, with the specified parameters.

Since the head location of region SRC1 is YEL and the point value is GRN and the configured comparison operator is Equals, the if statement will evaluate to False and decision SRC1_to_DST1 is *not* selected.

See also:

If (Expression)

Compare Attribute with Value

Description:

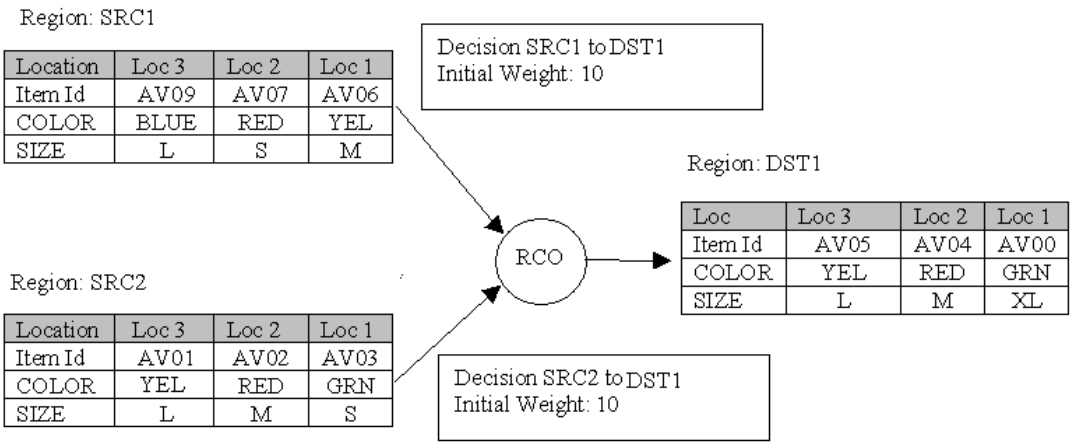
Expression Block which compares an attribute value to a value. If the two values meet the comparison criteria, then the condition is considered true.

Parameters:

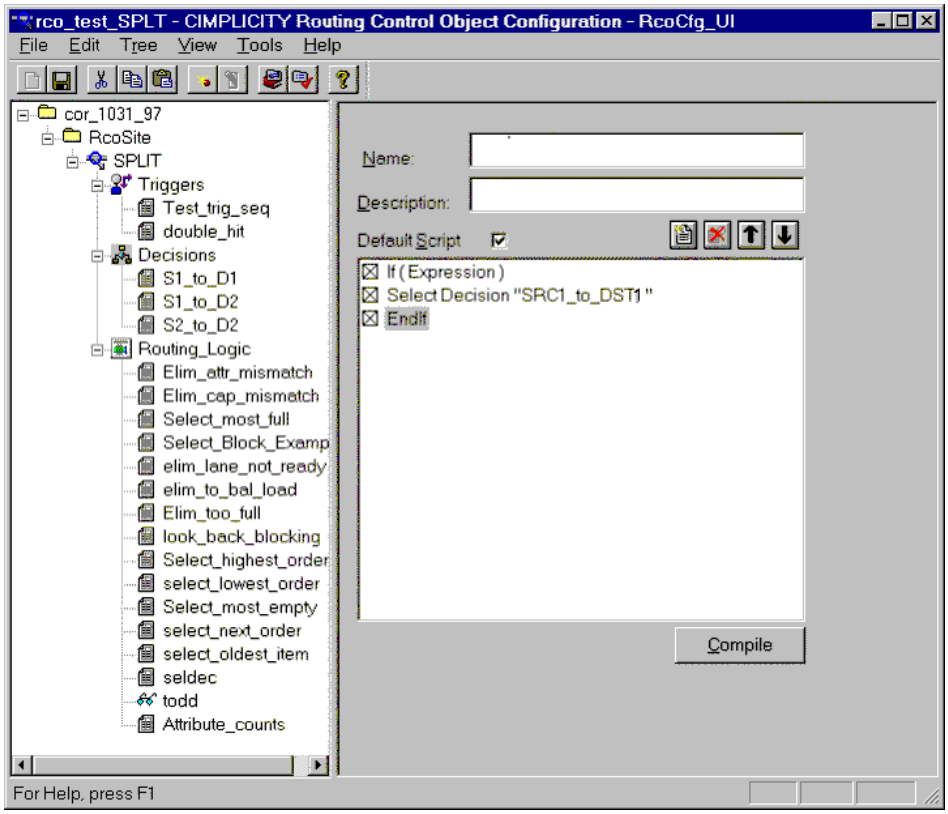
This function block has the following parameters:

Parameter	Description
Combine with	Used when combining multiple expression blocks. Defines the Boolean operation to be performed with each expression block.
Region ID	ID of Region where item is located.
Location	Location of the item in the Region.
Item Class	Class of the item.
Attribute ID	ID of Attribute whose value is to be compared.
Start Character	Starting character within the attribute value.
Attribute Length	Number of characters in attribute to compare. Specify 0 for the entire attribute.
Comparison Operator	Type of Comparison - Greater Than, Less Than, Equals.
Value	User specified comparison value.
Comparison Type	Numeric or alphanumeric comparison. If numeric comparison is selected, values are converted to integers before comparison.

Example


Region: SRC1
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV09 | AV07 | AV06
COLOR | BLUE | RED | YEL
SIZE | L | S | M
Decision SRC1 to DST1
Initial Weight: 10
Region: DST1
Loc | Loc 3 | Loc 2 | Loc 1
Item Id | AV05 | AV04 | AV00
COLOR | YEL | RED | GRN
SIZE | L | M | XL
RCO
Region: SRC2
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV01 | AV02 | AV03
COLOR | YEL | RED | GRN
SIZE | L | M | S
Decision SRC2 to DST1
Initial Weight: 10

Parameter	Value
Combine with	
Region ID	SRC1
Location	1
Item Class	VEHICLE
Attribute ID	COLOR
Start Character	0
Attribute Length	0
Comparison Operator	Equals
Value	YEL
Comparison Type	Alphanumeric



1. The above function block uses Compare Attribute with Value, with the specified parameters.
2. Since the head location of region SRC1 is YEL and the comparison value is YEL and the configured comparison operator is Equals, the if statement will evaluate to True and decision SRC1_to_DST1 is *selected.*

See also:

If (Expression)

Compare Point with Point

Description:

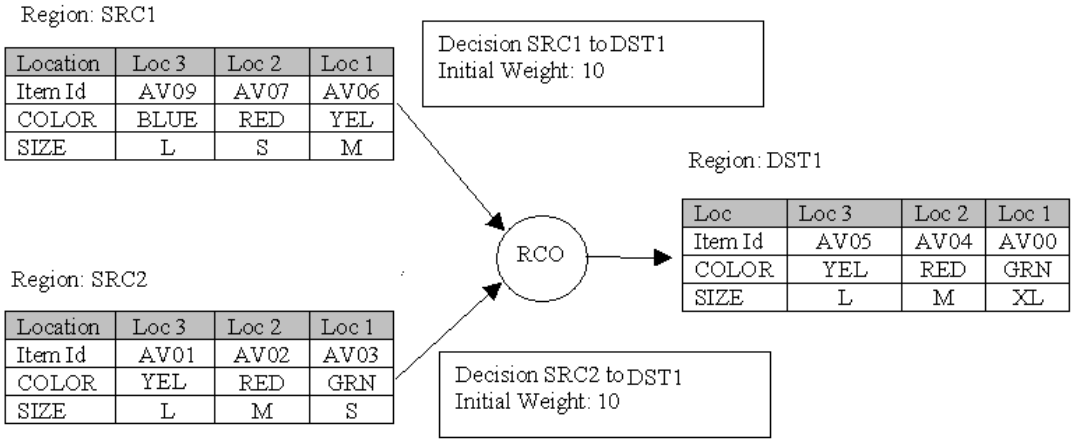
Expression Block which compares two points. If the two values meet the comparison criteria, then the condition is considered true.

Parameters:

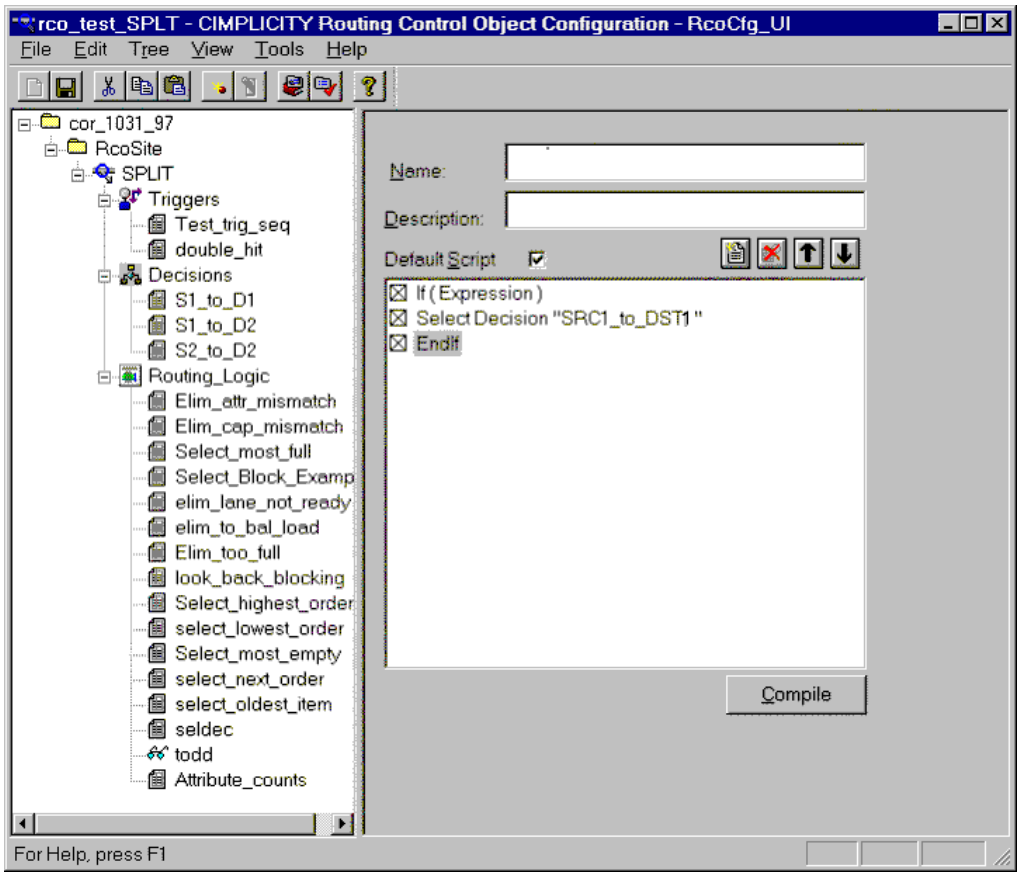
This function block has the following parameters:

Parameter	Description
Combine with	Used when combining multiple Expression blocks. Defines the Boolean operation to be performed with each Expression Block.
Point ID	ID of CIMPLCITY point whose value is to be used in the comparison.
Comparison Operator	Type of Comparison - Greater Than, Less Than, Equals.
Point ID	ID of CIMPLCITY point whose value is to be used in the comparison.
Comparison Type	Numeric or alphanumeric comparison. If numeric comparison is selected, values are converted to integers before comparison.

Example



Parameter	Value
Combine with	
Point ID	COMPARE_1
Comparison Operator	Equals
Point ID	COMPARE_2
Comparison Type	Numeric



1. The above function block uses Compare Point with Point, with the specified parameters.
2. Point **COMPARE_1** is an integer point and has a value of 10.
3. Point **COMPARE_2** is an integer point and has a value of 10.
4. Since both points are numeric, a numeric type comparison is performed between the two values. Since the specified operation is Equals and the points match, the if statement will evaluate to true and decision SRC1_to_DST1 is selected.

Compare Point with Value

Description:

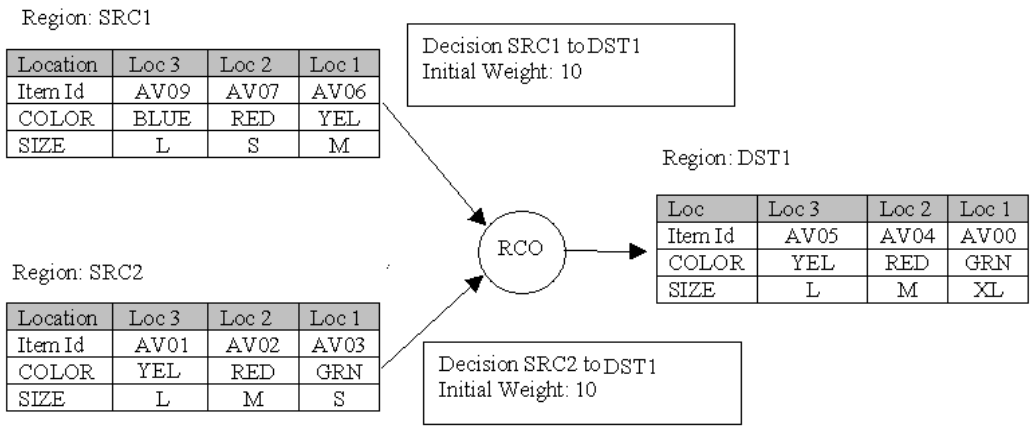
Description Expression Block that compares a point value to a user value. If the two values meet the comparison criteria, then the condition is considered true.

Parameters:

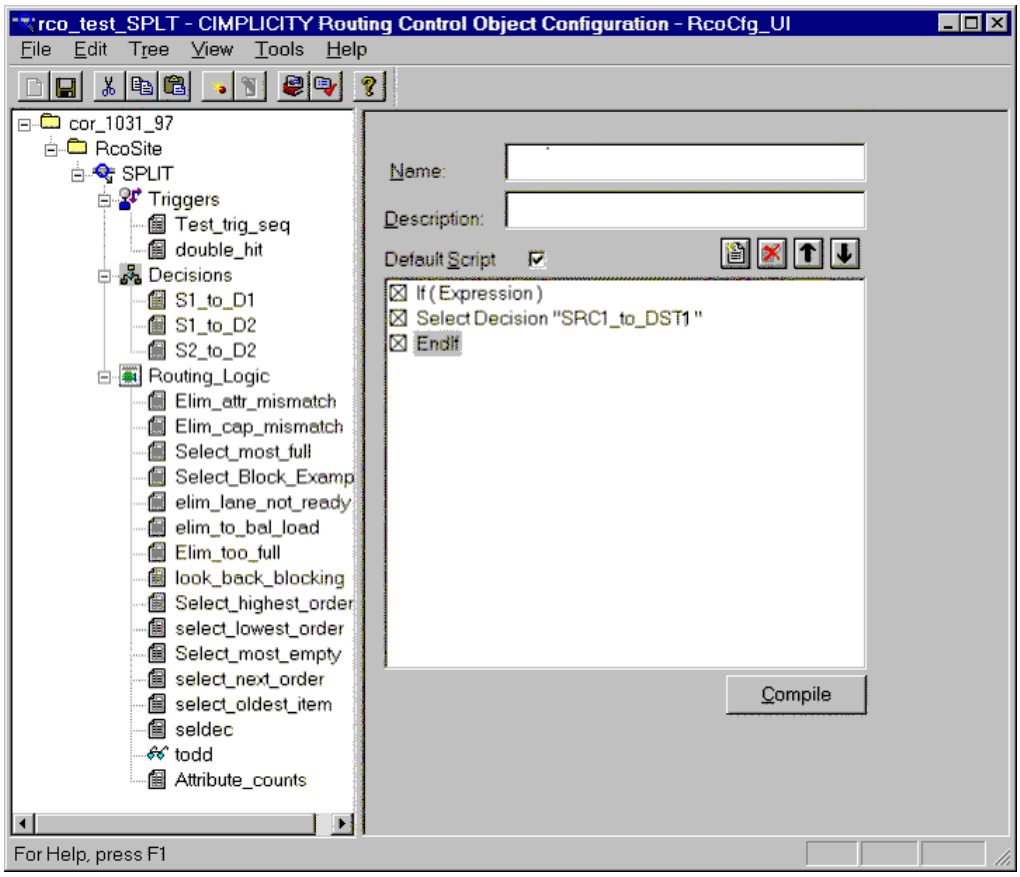
This function block has the following parameters:

Parameter	Description
Combine with	Used when combining multiple expression blocks. Defines the Boolean operation to be performed with each expression block.
Point ID	ID of CIMPLCITY point whose value is to be used in the comparison.
Comparison Operator	Type of Comparison - Greater Than, Less Than, Equals.
Value	User specified value.
Comparison Type	Numeric or alphanumeric comparison. If numeric comparison is selected, values are converted to integers before comparison.

Example


Region: SRC1
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV09 | AV07 | AV06
COLOR | BLUE | RED | YEL
SIZE | L | S | M
Decision SRC1 to DST1
Initial Weight: 10
Region: DST1
Loc | Loc 3 | Loc 2 | Loc 1
Item Id | AV05 | AV04 | AV00
COLOR | YEL | RED | GRN
SIZE | L | M | XL
RCO
Region: SRC2
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV01 | AV02 | AV03
COLOR | YEL | RED | GRN
SIZE | L | M | S
Decision SRC2 to DST1
Initial Weight: 10

Parameter	Value
Combine with	
Point ID	COMPARE_1
Comparison Operator	Equals
Value	11
Comparison Type	Numeric



1. The above function block uses Compare Point with Value, with the specified parameters.
2. Point COMPARE_1 is an integer point and has a value of 10.
3. Since the point is numeric, a numeric comparison is performed between the user value of 11 and the point value of 10. Since they don't match, the if expression evaluates to false and decision "SRC1_to_DST1" is not selected.

See also:

If (Expression)

Compare RCO Variables

Description:

Expression Block which compares two RCO Variables. If the two values meet the comparison criteria, then the condition is considered true.

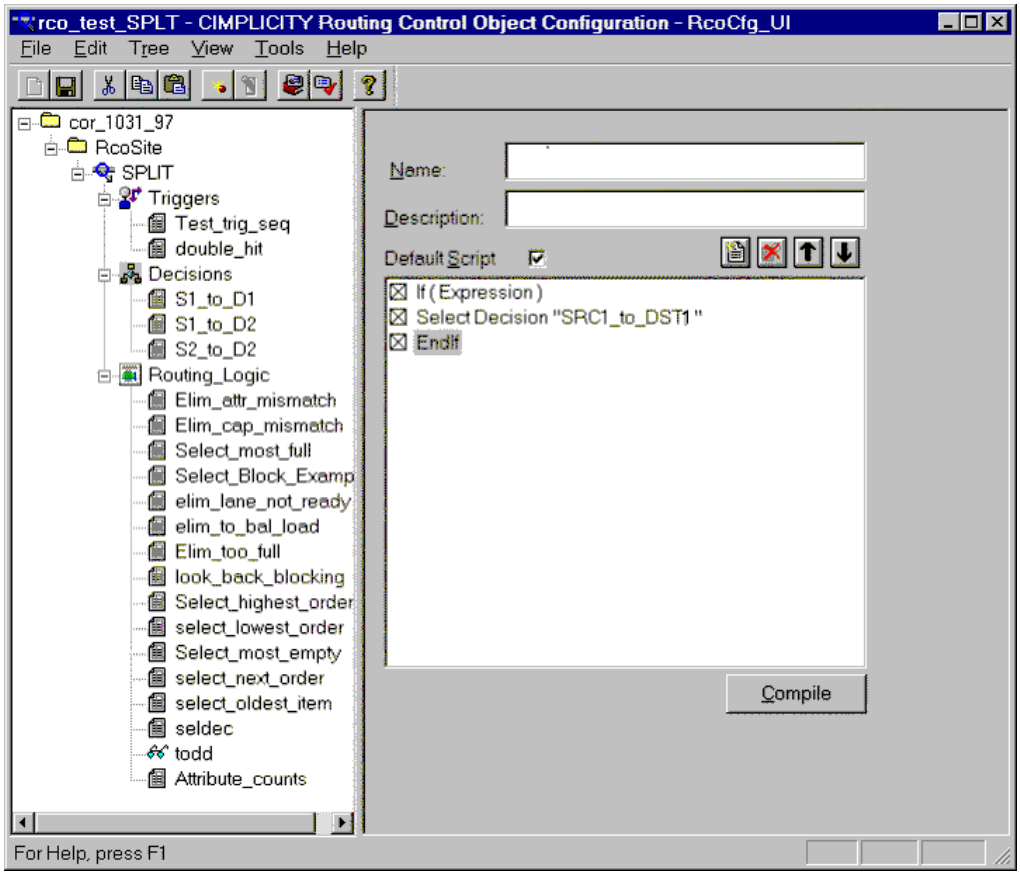
Parameters:

This function block has the following parameters:

Parameter	Description
Combine with	Used when combining multiple Expression blocks. Defines the Boolean operation to be performed with each Expression Block.
RCO Variable 1	First RCO Variable.
Comparison Operator	Type of Comparison - Greater Than, Less Than, Equals.
RCO Variable 2	Second RCO Variable.

Example

Parameter	Value
Combine with	
RCO Variable 1	XXX
Comparison Operator	Less Then
RCO Variable 2	YYY



1. The above function block uses Compare RCO Variables, with the specified parameters.
2. Since XXX is less than YYY, the condition evaluates to True and Decision SRC1_to_DST1 is selected.

Else Block

Description:

Used in conjunction with the If (Expression) Block to start a group of function blocks to be executed when the If condition evaluates to False.

Parameters:

This function block has no parameters.

See also:

CIMPLICITY Basic Control Engine Language Reference (GFK-1283)

If…Then…Else (Statement)

While Block

If (Expression) Block

Else If Block

End If Block

Else If (Expression)

Description:

Conditional function block used in conjunction with If (Expression) block. If the first If (Expression) evaluated to false, this block then executes and allows a second condition to be evaluated. The user must provide the conditional expression used in this block. All function blocks between the If (Expression) and the Else or End if Blocks are executed if the expression evaluates to True.

Routing Control has special types of function blocks called “Expression Blocks”. Expression Blocks do not show up in Routing Configuration’s function block list, but are available to any Conditional Function Block.

Parameters:

This function block has the following parameter:

Parameter	Description
Expression	One or more user specified Conditional Function Blocks.

See also:

CIMPLICITY Basic Control Engine Language Reference (GFK-1283)

If…Then…Else (Statement)

While Block

Else Block

End If Block

Important: We do not recommend adding more then 3 Conditional Expressions to an If Block.

End If

Description:

Used to terminate an If (Expression) block. Each and every If (Expression) block must have a matching End if Block.

Parameters:

This function block has no parameters.

See also:

CIMPLICITY Basic Control Engine Language Reference (GFK-1283)

If…Then…Else (Statement)

While Block

Else Block

Else If Block

If (Expression) Block

End Select Block

Description:

Used to Terminate a Select Block. Each Select Block should have a matching End Select Block.

Parameters:

This function block has no parameters.

See also:

CIMPLICITY Basic Control Engine Language Reference (GFK-1283)

Select …Case (Statement)

Select Case Block

Case Block

End While

Description:

Used to Terminate a **`While Block`**. Each **`While Block`** should have a matching **`End While`**.

Parameters:

This function block has no parameters.

See also:

CIMPLICITY Basic Control Engine Language Reference (GFK-1283)

Select …Case (Statement)

Select Case Block

Case Block

If (Expression)

Description:

Conditional function block. This block provides the same functionality as the BCE If…Then…Else statement. The user must provide the conditional expression used in this block. All function blocks between the If (Expression) and the Else or End if Blocks are executed if the expression evaluates to True.

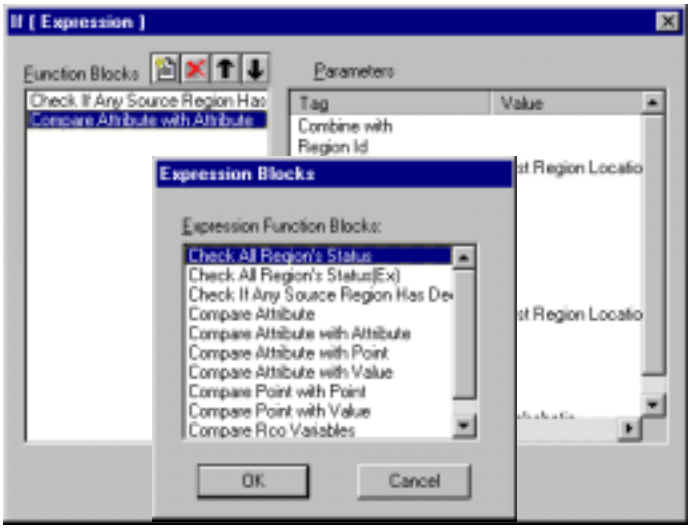
Routing Control has special types of function blocks called “Expression Blocks”. Expression Blocks do not show up in Routing Configuration’s function block list, but are available to any Conditional Function Block.

Parameters:

This function block has the following parameter:

Parameter	Description
Expression	One or more user specified Conditional Function Blocks.

Example



The user may select as many Expression Blocks as necessary. Each block is combined with an And/Or.

The first Conditional Expression Block selected has a field for "Combine With". This is not used on the first block in a condition, and should be left blank.

See also:

CIMPLICITY Basic Control Engine Language Reference (GFK-1283)

If…Then…Else (Statement)

While Block

Else Block

Else If Block

End If Block

Note: We do not recommend adding more then 3 Conditional Expressions to an If Block.

Select Block

Description:

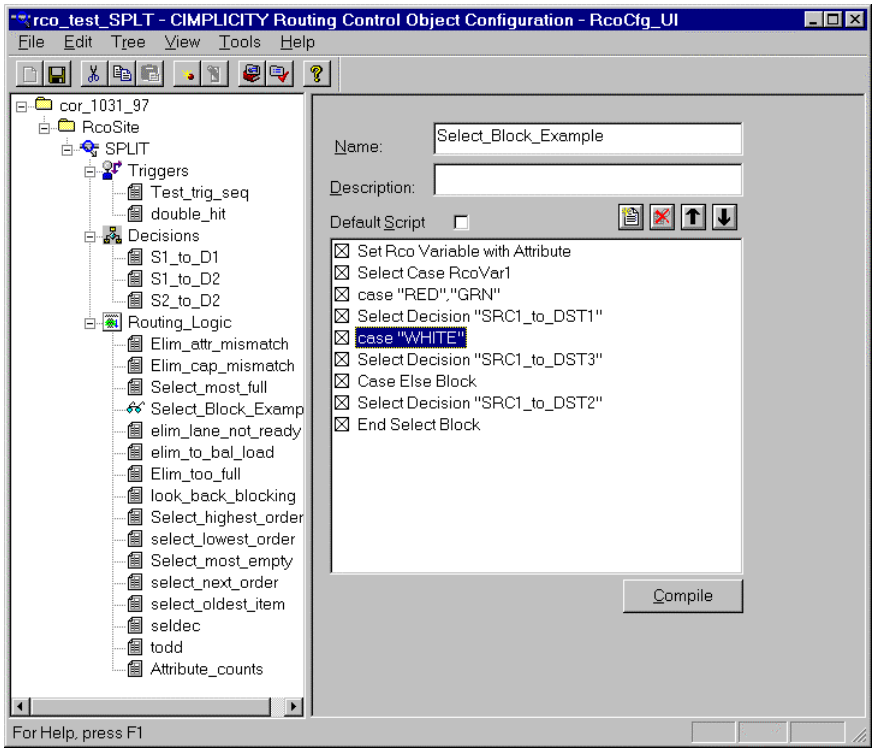
A BCE **`Select`** clause of a **`Select …. Case`** statement. This block starts the statement. It must be followed by at least one **`Case Block`** and an **`End Select Block`**.

Parameters:

This function block has the following parameter:

Parameter	Description
Expression	An RCO Variable or any String or numeric expression. Strings must be in closed in double quotes.

Example



The above function block uses a Select Block and all related blocks.

1. First, load tribute into an RCO Variable. For this example, the Attribute "COLOR" is loaded into RCO Variable 1.
2. The next **`Select Block`** will perform a comparison on the contents of the RCO Variable. This example uses an RCO Variable, but any string or numeric expression will also work.
3. The next block is a **`Case Block`**, and it is doing a comparison on "RED" and "GRN". If the RCO Variable contains either of these two values, then the function blocks immediately following the **`Case Block`**, up to the next **`Case Block`**, **`Case Else`** or **`End Select`**, will be executed. After the statements are executed, execution will jump to the block immediately following the **`End Select Block`**.

4. The same operation will be performed on the next **`Case Block`**.
5. The next block is the **`Case Else Block`**. The function blocks immediately following the **`Case Else Block`** are executed if none of the other **`Case Blocks`** in this statement evaluated to True.
6. Finally, the **`End Select Block`** terminates the **`Select Statement`**.

See also:

CIMPLICITY Basic Control Engine Language Reference (GFK-1283)

Select…Case (statement)

Select Block (Function Block)

Case Else Block (Function Block)

While (Expression)

Description:

Similar to an If (Expression), except the function blocks between the While (Expression) and the End While block are executed until the condition evaluates to False.

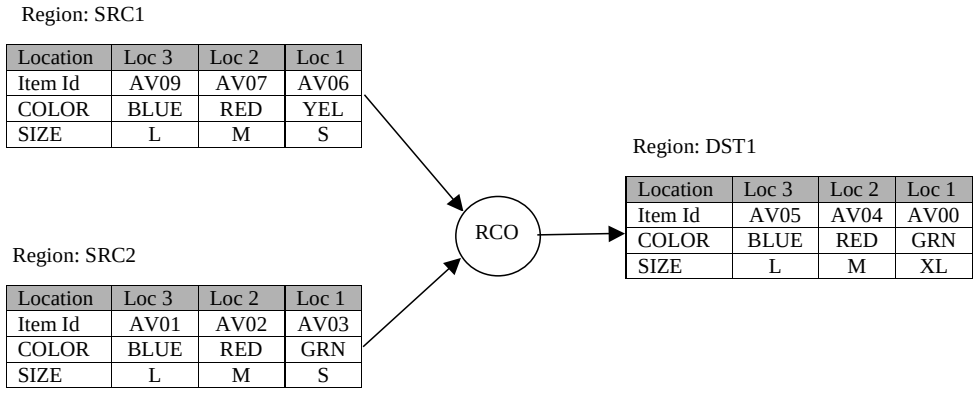
Routing Control has special types of function blocks call “Expression Blocks”. Expression Blocks do not show up in Routing Configuration’s function block list, but are available to any Conditional Function Block.

Parameters:

This function block has the following parameter:

Parameter	Description
Expression	One or more user specified Conditional Function Blocks.

Example


Region: SRC1
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV09 | AV07 | AV06
COLOR | BLUE | RED | YEL
SIZE | L | M | S
Region: SRC2
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV01 | AV02 | AV03
COLOR | BLUE | RED | GRN
SIZE | L | M | S
RCO
Region: DST1
Location | Loc 3 | Loc 2 | Loc 1
Item Id | AV05 | AV04 | AV00
COLOR | BLUE | RED | GRN
SIZE | L | M | XL

See also:

CIMPLICITY Basic Control Engine Language Reference (GFK-1283)

If…Then…Else (Statement)

Important: We do not recommend adding more then 3 Conditional Expressions to a **`While`** Block.

PRT Function Blocks

Add PRT Item

Description:

Adds a new Item to PRT.

Parameters:

This function block has the following parameters:

Parameter	Description
Item ID	Specify the Item ID for the new item.
Ref Id	Specify the Reference ID for the item.
Item Type	Specify the Item Type or pick from a RCO Variable.
Region ID	Specify the Region in which to create the item.
Region Location	Specify the location in the region where item has to be created.
Comment	Specify the description for the item to be created.

Pseudo Code:

```
Create a new PrtItem
Assign  ItemId
Assign RefId
Assign ItemTypeId
Assign RegionId
Assign RegionLoc
Assign Comment
Assign UserId to Sitename.Scriptname
Assign Status
Add the item
```

Associate Item

Description:

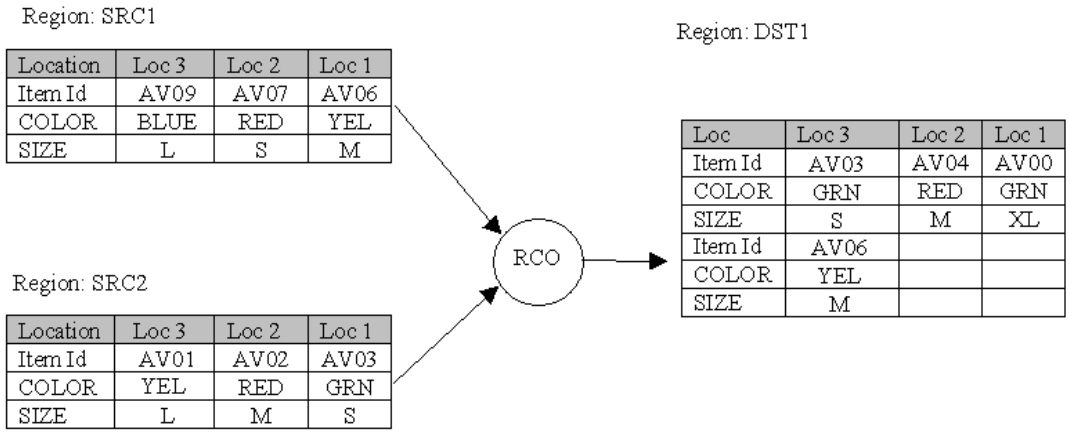
Associate two PRT Items. Will move a PRT item into a location already occupied by a second PRT Item. This function block is used in place of a PRT Combine Region.

Parameters:

This function block has the following parameters:

Parameter	Description
Source Region ID	Specifies the source region.
Source Region Location	Specifies source region location.
Destination Region ID	Specifies the destination region.
Destination Region Location	Specifies destination region location.
Item Type	Specifies item type to move. [optional].
Item Class	Specifies item class to move. [optional].
Insert	Specifies how the items should be added to the destination region location. Click either **Add** or **Insert**.
Auto Associate	Specifies if item(s) should be associated to the first serialized item in the destination region location.

Example



First Blocks Parameters

Parameter	Description
Source Region ID	SRC1
Source Region Location	1
Destination Region ID	DST1
Destination Region Location	PRT_LAST
Item Type	
Item Class	VEHICLE
Insert	Insert

Auto Associate	False

Second Blocks Parameters

Parameter	Description
Source Region ID	SRC2
Source Region Location	1
Destination Region ID	DST1
Destination Region Location	PRT_LAST
Item Type	
Item Class	VEHICLE
Insert	Add
Auto Ass*ociate*	False

An Output Module with two Associate Item Blocks is executed.

The first block takes the item from the head location of Region SRC1 and inserts it into the tail location of region DST1.

The second block takes the item from the head location of region SRC2 and adds it to the tail location of region DST1.

Pseudo Code:

```
Locate the PRT Item
If Insert specified
  Insert the item into the specified location of Destination region
Else
  Add the item to the specified location
End if
```

See also:

Disassociate Item

Delete Item

Description:

Delete a PRT Item from the tracking model with a supplying disposition and optional comment.

Parameters:

This function block has the following parameters:

Parameter	Description
Region ID	Specifies the region from which the item is to be deleted.
Region Location	Specifies the region location.
Item Type	Specifies the item type to be deleted [optional].
Item Class	Specifies the item class to be deleted [optional].
Disposition	How the item is to be deleted. ▪ Scrap: Scrap the item ▪ Delete: Delete the item ▪ No Check Scrap: Scrap the item overriding region locking status. ▪ No Check Delete: Delete the item overriding region locking status.
Comment	Comment to send to log file. [optional].

Disassociate Item

Description:

Move a single item out of a region. This block can be used in place of a PRT disperse region. If the item doesn't exist, raise an exception.

Parameters:

This function block has the following parameters:

Parameter	Description
Source Region ID	Specifies the source region.
Source Region Location	Specifies the source region location.
Destination Region ID	Specifies the Destination Region.
Destination Region Location	Specifies Destination Region Location.
Item Type	Specifies item type to move.
Item Class	Specifies item class to move.
Insert	Specifies how the items should be added to the destination region location.

See also:

Associate Item

Load PRT Item into Item Variable

Description:

Load a BCE PrtItem object with specific item information.

Parameters:

This function block has the following parameters:

Parameter	Description
Region ID	Specify the Region ID.
Item Class	Specify the item class.
Source Region Location	Select the Region Location or enter a number greater then 1.

Note: The variable name is **`item`**.

Load PRT Region Data into Region Variable

Description:

Load a BCE PrtRegion object with a specific item information. If the region doesn't exist, raise an exception.

Parameters:

This function block has the following parameter:

Parameter	Description
Region ID	Specify the Region ID to load.

Note: PrtRegion object name is Region.

Move Item

Description:

Move a PRT Item. If no item class or item type is specified, then all items at the source region are moved.

Parameters:

This function block has the following parameters:

Parameter	Description
Source Region ID	Specifies the source region.
Source Region Location	Specifies source region location.
Destination Region ID	Specifies the destination region.
Destination Region Location	Specifies destination region location.
Item Type	Specifies item type to move. [optional].
Item Class	Specifies item class to move. [optional].
Insert	Specifies how the items should be added to the destination region location.

Pseudo Code:

```
If Item type and Item Class were not specified
  For each serialized item at region and location
    IF the item's reference id and item id are not blank
      Move the serialized item to the destination
      Moving the serialized item will also move the non-serialized items
    End if
  Next item
  If no serialized items exist at the location
  For each non serialized item
    Move to the destination location
  Next non serialized item
Else
  For each item of the specified item type or class type
    Move to new location
  Next
End if
```

Set PRT Item Data

Description:

Update a PRT item with user specified information.

Parameters:

This function block has the following parameters:

Parameter	Description
Region ID	Specify the Region, Leave Blank to use Selected Decision's Source.
Region Location	Specify the region location.
Item Class	Specify the item class.
Item ID	Specify new Item ID. Note that, for serialized items, Item ID and Reference ID cannot be changed at the same time.
Reference ID	Specify new Reference ID. Note that, for serialized items, Item ID and Reference ID cannot be changed at the same time.
Item Type	Specify item type.
Status Mask	Specify the mask for the status bits that will be effected by the Status parameter.
Status	Specify the item status.
Set All Attributes To Value1	Sets All Attributes of the item to the Value1 parameter (which defaults to empty string).
Attribute1	Specify attribute to add.
Value1	Specify attribute value.
Attribute2	Specify attribute to add.
Value2	Specify attribute value.
Attribute3	Specify attribute to add.
Value4	Specify attribute value.
Attribute5	Specify attribute to add.
Value5	Specify attribute value.
Attribute6	Specify attribute to add.
Value6	Specify attribute value.
Attribute7	Specify attribute to add.
Value7	Specify attribute value.
Attribute8	Specify attribute to add.
Value8	Specify attribute value.
Attribute9	Specify attribute to add.
Value9	Specify attribute value.
Attribute10	Specify attribute to add.
Value10	Specify attribute value.

Set PRT Item with another PRT Item

Description:

Copy one PRT Item to another.

Parameters:

This function block has the following parameters:

Parameter	Description
Source Region ID	Specify the region. Leave blank to use selected decision's source region.
Source Region Location	Specify the region location.
Source Item Class	Specify the item class.
Destination Region ID	Specify the region. Leave blank to use selected decision's source region.
Destination Region Location	Specify the region location.
Destination Item Class	Specify the item class.
Status Transfer Mask	Specify what item status bits to copy.
Transfer Item Type ID	Specified whether or not to copy the item type ID.
Transfer All Attributes	Specify whether to copy all attributes or just some.
Attribute1	Specify the attribute to copy.
Attribute2	Specify the attribute to copy.
Attribute3	Specify the attribute to copy.
Attribute4	Specify the attribute to copy.
Attribute5	Specify the attribute to copy.
Attribute6	Specify the attribute to copy.
Attribute7	Specify the attribute to copy.
Attribute8	Specify the attribute to copy.
Attribute9	Specify the attribute to copy.
Attribute10	Specify the attribute to copy.

Pseudo Code:

```
If the specified source region is blank
  Get the region id from the selected decision’s source region
Else
  Use the specified source region
End if
If no items found in region at specified location
  Raise exception
End if
If the specified destination region is blank
  Get the destination region id from the selected decisions source region
Else
  Use the specified source region
End if
If the status bit mask is not zero
  'Transfer Status Bits
    Mask% = Not Status Mask
  ' clear transferred Bits
    Item2Status = Item2Status And Mask%
  ' Copy transferred bits
    Mask% = Item1Status And Status Mask
  ' Transfer the bits
    Item2Status = Item2Status Or Mask%
End if
If transfer all attributes
  For each attribute in source item
    Read attribute
    Write attribute to destination items
  Next
Else
  For each of the 10 possible attributes
    If current attribute id is not blank
      Read source attribute
      Write value to destination attribute
   End if
End if
```

Set Source Region as Decision Made

Description:

This is an output function block. Clears the 'Waiting For Decision' Region flag of the source region of the selected decision.

Parameters:

This function block has no parameters.

Pseudo Code:

```
Clear Status Bit PRT_REGION_WAITING_FOR_DEC for Source Region of the selected
       decision
```

See also:

Eliminate Decisions Based on Region Status.

Diagnostic Blocks

Dump Available Decisions

Description:

Dump Available Decisions writes a list of available still possible decisions to the status log.

Parameters:

This function block has the following parameters:

INPUT

Tag	String user defined value to be written with decision name.

OUTPUT

Still possible decisions are written to the status log.

If no decisions are possible, then *No Decisions Left* are written.

Site Log Generator

Description:

`Site Log Generator` generates a line I the CIMPLICITY status log.

Parameters:

This function block has the following parameters:

Status Level	Success, warning or failure status message of the entry.
Procedure Name	Specifies the procedure/module name to label the 40-character logged message with:

Message	Specifies the message to be logged. (40-character string).
Error Code	Specifies an integer to identify a particular message type.
Reference Code	Specifies an integer to identify a particular message type.
User Value1	A user defined value to be inserted into the Alarm Message.
User Value2	A user defined value to be inserted into the Alarm Message.
User Value3	A user defined value to be inserted into the Alarm Message
User Value4	A user defined value to be inserted into the Alarm Message.

`OUTPUT`

Entry in the CIMPLICITY status log.

Include Function Blocks

Include File

Description:

Includes the contents of the specified file into the generated script.

Parameters:

This function block has the following parameters:

Parameter	Description
Include File Name	The path of the file to be included.

Pseudo Code

```
#include"c:\gefanuc\includes\FuncsLib.txt"
```

Note: This function block works in the same way the #include"<file>" workin C/C++. This function block accepts a files that has only simple VB statements, and not the functions / sub-routines declaration. Since the entire contents of the file would be included with the Main function of the generated script.

See Also:

Section entitled "RCO Folder Properties" in Chapter 3, "Configuring Routing Control Objects" for information on using the Global Library to include files that have functions / subroutines defined within them.

Appendix A - RCO External Decision

Overview

The RCOExtDec Application Programmer Interface (API) is used to access decisions from an external process. There are five API functions associated, each of which is explained in detail in this section.

The RCOExt Dec API:

- Creates the auxiliary port for asynchronous decision request handling.
- Reads the messages on the auxiliary port.
- Stores messages in queue.
- Provides messages to the application using the API.
- Sends the response to the requestor.

Note: he response packed is provided by the application using this API.

RCO External Decision API Functions

The following RCOExtDec API functions are explained herein:

- ExtDec_api_init
- ExtDec_api_get_msg
- ExtDec_api_init_comm
- ExtDec_api_send_decision
- ExtDec_api_term

ExtDec_api_init

The ExtDec_api_init function initializes the RCO External Decision API. It allocates memory for a read / write buffer, creates an auxiliary asynchronous port, and initializes internal data structures. The event flag passed in will be set when asynchronous messages are received from the RCO. This routine must be called after the application calls ipc_register, and before calling any other RCOExtDec API routine.

Syntax:

COR_14 ExtDec_api_init (COR_U4 Event flag, COR_STATUS * Restat)

Input Arguments:

Event flag	Event flag used to indicate when asynchronous messages have arrived from the RCO process.

Output Arguments:

Restat	Pointer to status structure.

Return Value:

Either COR_SUCCESS, COR_WARNING or COR_FAILURE. If the function returns COR_WARNING or COR_FAILURE, additional error information can be found in restat.err_msg and restat.err_code. If COR_FAILURE is returned, the error was severe enough that the application should perform an orderly termination.

ExtDec_api_get_msg

The ExtDec_api_get_msg function is responsible for retrieving information from all asynchronous messages coming from an RCO. It is used if the application process is acting as an External Decision-making process; that is, this API function should be invoked by those applications that are expected to supply decisions to an RCO.

This function must be invoked when the event flag reserved for the ExtDec_api_init routine is set High. When this event is set High, the application program calls this function to unload the data contained in the message received from RCO process. This routine should be called repeatedly until it returns a status indicating that there are no more messages to retrieve.

The msg_type argument indicates which type of message has been received. The application determines which type of message was received and responds accordingly. If msg_type field indicates that a decision request was received, the application program should return a decision buffer to RCO using the RCOExt_Send_decision routine. If the msg_type indicates that the message is an exception indicator, the application should take the appropriate action. No response is needed to return to RCO. The exception condition is stored in the exception_flag field in the ctrl_loc_msg argument.

Syntax:

```
COR_14 ExtDec__api_get_msg(DADDR*addr,Cor_14*msg_type,PDC_DEC_REQUEST*
dec_req, PDC_CTRL_LOC*ctrl_loc_msg, COR_STATUS*restat)
```

Input Arguments:

None

Output Arguments:

`addr`	Address of RCO process that sent the message.
`msg_type`	Pointer to type of message received (Either PDC_DEC_REQ_MSG or PDC_CTRL_LOC_MSG).
`dec_req`	Pointer to PDC_DEC_CTRL_REQUEST structure.
`ctrl_loc_meg`	Pointer to PDC_CTRL_LOC_MSG structure.
`restat`	Pointer to status structure.

Return Value:

Either COR_SUCCESS, COR_WARNING or COR_FAILURE. If the function returns COR_WARNING or COR_FAILURE, additional error information can be found in restat.err_msg and restat.err_code. If COR_FAILURE is returned, the error was severe enough that the application should perform an orderly termination. COR_WARNING will be returned when there are no more messages that need to be retrieved by the application program. PDCI_LAST_MESSAGE will be reported in restat.err_code.

ExtDec_api_init_comm

The ExtDec_api_init_comm function sends an INIT_SEG message to calling process (whose DADDR * is passed in), thereby allowing the calling process to recognize the async port address. This port will then handle the subsequent decision requests from the calling process. This routine must be called after the application calls and INIT_SEG is received from RCO.

Syntax:

```
COR_14 ExtDec_api_init_comm (DADDR*addr,Cor_STATUS*restat)
```

Input Arguments:

`addr`	Address of RCO process that send INIT_SEG.

Output Arguments:

`Restat` Pointer to status structure.

Return Value:

Either COR_SUCCESS, COR_WARNING or COR_FAILURE. If the function returns COR_WARNING or COR_FAILURE, additional error information can be found in restat.err_msg and restat.err_code.

ExtDec_api_send_decision

The ExtDec_api_send_decision function sends a decision buffer to the RCO. If the external process is unable to return a decision, this function should be called after setting the dec_quantity field to zero in the PDC_CTRL_DECISIONS structure.

Syntax:

```
COR_14 ExtDec_api_send_decision
(DADDR*addr,PDC_CTRL_DECISIONS*ctrl_loc_dec,COR_STATUS*)
```

Input Arguments:

`addr`	Address of RCO process that will receive decisions.
`Ctrl_loc_dec`	Pointer to structure containing a list of control decisions.

Output Arguments:

`Restat`	Pointer to status structure.

Return Value:

Either COR_SUCCESS, COR_WARNING or COR_FAILURE. If the function returns COR_WARNING or COR_FAILURE, additional error information can be found in restat.err_msg and restat.err_code.

ExtDec_api_term

The ExtDec_api_term function is responsible for reallocating message buffers and configuration data. All applications that call ExtDec_api_init must also call this routine prior to process termination.

Syntax:

COR_14 ExtDec_api_term (COR_STATUS*)

Input Arguments:

None

Output Arguments:

Restat	Pointer to status structure.

Return Value:

Either COR_SUCCESS, COR_WARNING or COR_FAILURE. If the function returns COR_WARNING or COR_FAILURE, additional error information can be found in restat.err_msg and restat.err_code. If COR_FAILURE is returned, the error was severe enough that the application should perform an orderly termination.

RCOExtDec API Calls in relation to PDC_API Calls

RCOEXTDEC API Calls	Corresponding PDC_API Calls
`COR_14 ExtDec_api_init (COR_U4, COR_STATUS)`	`COR_14 pdc_api_init (COR_U4, COR_STATUS)`
`COR_14 ExtDec_api_get_msg (DADDR*, COR_14, PDC_DEC_REQUEST*, PDC_CTRL_LOC*, COR_STATUS)`	`COR_14 pdc_api_get_msg (COR_14*, PDC_DEC_REQUEST*, PDC_CTRL_LOC*, COR_STATUS)`
`Additional argument DADDR* - address of requesting process (read from message)`	
`COR_14 ExtDec_api_init_comm (DADDR*, COR_STATUS*)`	`Used by pdc_api_init as init_comm (internal function—not exported), to initialize communication with Controller processes configured to talk to external process using this API.`
`COR_14 ExtDec_send_decision (DADDR*, COR_14, PDC_CTRL_DECISIONS*, COR_STATUS)`	`COR_14 pdc_api_send_decision (PDC_CTRL_DECISIONS*, COR_STATUS*)`
`Additional argument DADDR* - address of requesting process.`	
`COR_14 ExtDec_api_term (COR_STATUS)`	`COR_14 pdc_api_term (COR_STATUS)`

External Decision Simulator

The External Decision Simulator is used to test RCOExtDec API process. External decisions are simulated and provided to the appropriate structures. The Simulator is structured like PDC_SIM (Test driver) and uses three basic sets of functions as follows:

- Set 1. Framework Functions
- Set 2 Data Management and Event Handler Functions
- Set 3. RCOExtDec API Calls.

Set 1. Framework Functions (ExtDec_Sim

The framework functions include main program, event handler loop, and cleanup. The main program initializes IPC, registers itself with router, initializes data structures (decisions as read from file) through set two function calls, and initializes RCOExtDec API through RCOExtDec_api_init API call..)

The Framework function process is:

1. RCO ExtDec_api_init initializes the API's data structures.
2. Async ports are created to handle decision request messages.
3. Once initialized, the main program calls the event handler loop.
4. Event handler loop continuously checks for any message (read timeout = one second) on both main port and async port (through event flag).
5. The appropriate handlers are called (set two functions) through function pointers for these messages.
6. Once the main port receives TERM_SEG or Router dies, the main program calls CleanUp function to free the allocated memory.
7. Process terminates.

Set 2. Data Management and Event Handler Functions (ExtDec_SimData.cpp)

The data management and event handler functions being with a prefix, DecEml_, and provide support for simulating the external decisions. Simulated decisions are read from file Dec_sim.rco, which resides in sc_path directory, and stored in the appropriate structures. Whenever a request is made for one or n decisions, they are provided to caller from these structures. The event handler functions read the message from async port (through API calls), retrieves the data from decision structures, and sends the response to call (through API calls).)

The Data Management function process is:

1. int **DecEml_init_data** (COR_STATUS*)
   Reads the decision and its control location information from Dec_Sim.Rco file, and stores it in the data structure (decision table).

   Note: The Dec_Sim.Rco file has a .cfg file format, and all file operations are performed using the IDTPOP utility. A sample format is provided in ExtDec_SimData.cpp file.

2. int **DecEml_get_next_decision** (PDC_DEC_REQUEST*, PDC_CTRL_DECISIONS*)

   Retrieves the number of decisions from the decision table based on request information, and provides them in PDC_CTRL_DECISIONS structure.

3. int **DecEml_handle_info_msg** (PDC_CTRL_LOC*)
   Retrieves the controller information from internal structures.

4. void **DecEml_cleanup** ( )

   Removes decision table and other structures from memory.

5. void **DecEml_reset_ctrl_dec** ( )

   Resets the current pointer in the decision table, which renders it the first decision to be provided.

The Event Handler function process is:

1. int **DecEml_api_init** (COR_STATUS*,int)
   Initializes data and RCOExtDec API.
   Calls DecEml_init_data for application data initialization and RCOExtDec_api_init API function for API initialization.

2. int **DecEml_api_main_init** (DADDR*,COR_STATUS*)
   Initiates communication with RCO. When RCO sends an INIT_SEG to main port, this function calls RCOExtDec_api_init_comm API to send an INIT_SEG to RCO through async port; thereby enabling RCO to recognize async port and to send all subsequent decisions to async port.

3. int **DecEml_api_process** (COR_STATUS*)
   When the event flag indicates a message's arrival at async port, this function is called; which in turn, calls DecEml_handle_decision_requests function.

4. int **DecEml_handle_decision_requests** (COR_STATUS*)
   Forces ExtDec_api_get_msg to retrieve messages from async port. If it is a decision request, it calls DecEml_get_next_decision to obtain the number of decisions from the decision table, and sends these decisions to the requestor through ExtDec_api_send_decision API call.

5. int **DecEml_api_cleanup** (COR_STATUS*)
   Calls DecEml_cleanup and ExtDec_api_term API call.

Calls table:

EXTDEC_SIM Calls	PDC_SIM Calls
int DecEml_init_data (COR_STATUS*)	int g2_init (COR_STATUS*)
int DecEml_get_next_decision (PDC_DEC_REQUEST*, PDC_CTRL_DECISIONS*)	int g2_get_next_decision (PDC_DEC_REQUEST*, PDC_CTRL_DECISIONS*)
int DecEml_handle_info_msg (PDC_CTRL_LOC*)	int g2_handle_info_msg (PDC_CTRL_LOC*)
void DecEml_cleanup( )	void g2_cleanup( )
void DecEml_reset_ctrl_dec( )	void g2_reset_ctrl_dec (ctrl_loc_id_ptr)
int DecEml_api_init (COR_STATUS*,int)	int g2_api_init (COR_STATUS*, int)
int DecEml_api_main_init (DADDR*, COR_STATUS*,int)	int g2_api_main_init (COR_STATUS*, DADDR*, int event_flag)
int DecEml_api_process (COR_STATUS*,int)	int g2_api_process (COR_STATUS*)
int DecEml_api_handle_decision_requests (COR_STATUS*)	int handle_decision_requests (COR_STATUS*)
int DecEml_api_cleanup (COR_STATUS*)	int g2_api_cleanup (COR_STATUS*)

Set 3. RCO External Decision API Calls

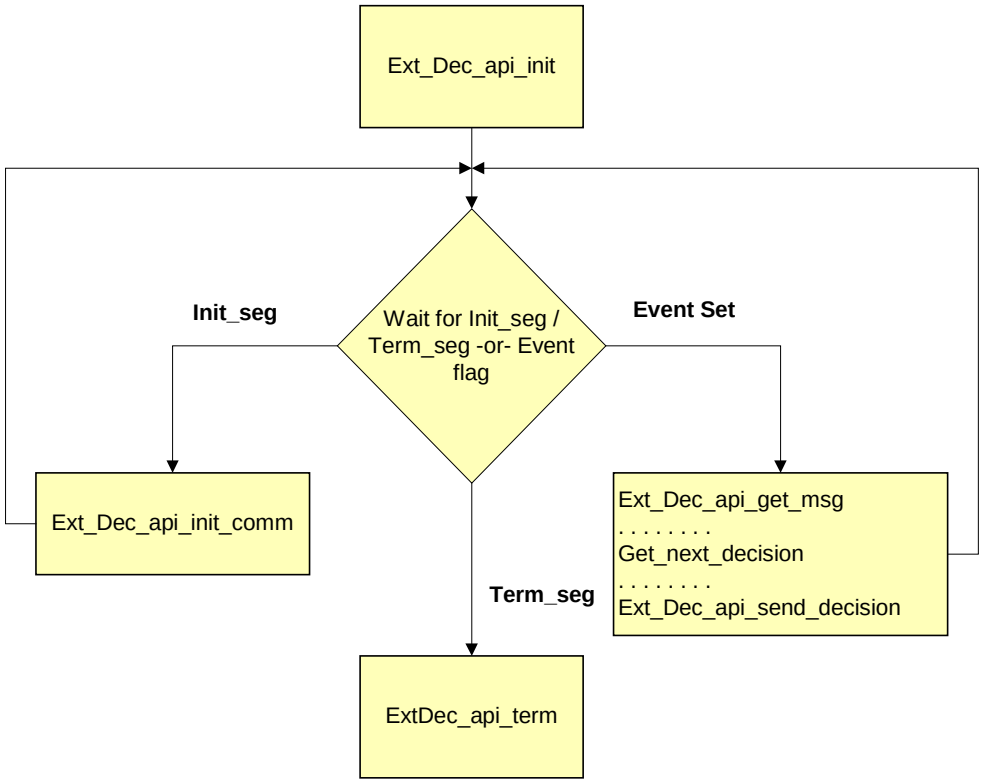
The RCO External Decision API calls are described in detail in the *"RCO External Decision API Functions"* section.

Process Flowchart

Process flowchart

The following flowchart depicts the process between the Decision Simulator interface and RCOExtDec API:

Simulator interface with RCOExtDec API



Simulator Configuration Requirements

Four of the five files needed to configure the External Decision Simulator can be found in the Master directory of CIMPLICITY. The files are in binary format and must be converted to ASCII text using the IDTPOP Utility. The master.mcp can be edited directly. Also, files that have overlapping fields (for example, **`process_id`**) must have identical values in order to run the simulator. Sample configuration files are provided for your reference in this section.

The required configuration files are:

- `physproc.dat`
- `logproc.dat`
- `node_logproc.dat`
- `service.dat`
- `master.mcp`

The following steps provide instruction on configuring External Decision Simulator:

Step 1 Open RCO project in Workbench

Step 2 Configure physproc

Step 3. Configure logproc

Step 4 Configure node_logproc

Step 5 Configure service

Step 6 Configure master.mcp

Step 7 Copy Decision configuration file

Step 1. Open RCO Project in Workbench

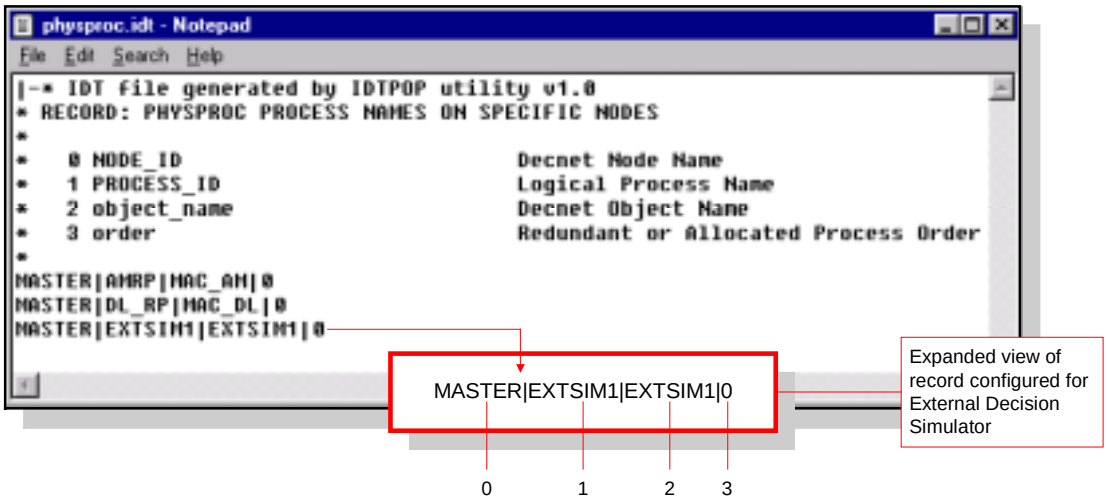
1. From the Windows desktop, press Start.
2. Select Programs>CIMPLICITY>HMI>Workbench.

   The Workbench window opens.
3. In the Workbench window, click File on the menu bar.
4. Select Open option to display the Open dialog box.
5. Navigate to your RCO project and click on it.
6. Click **Open** to open your project in the Workbench window.

Tip: To open a project quickly, create a shortcut for the project on your Windows desktop and double-click the icon.

Step 2. Configure physproc

1. Use the IDTPOP Utility to convert the file to ASCII-text using the text editor of your choice, e.g. Notepad.
2. Press **Ctrl+End** to bring you to the next available line to enter your record—see figure.



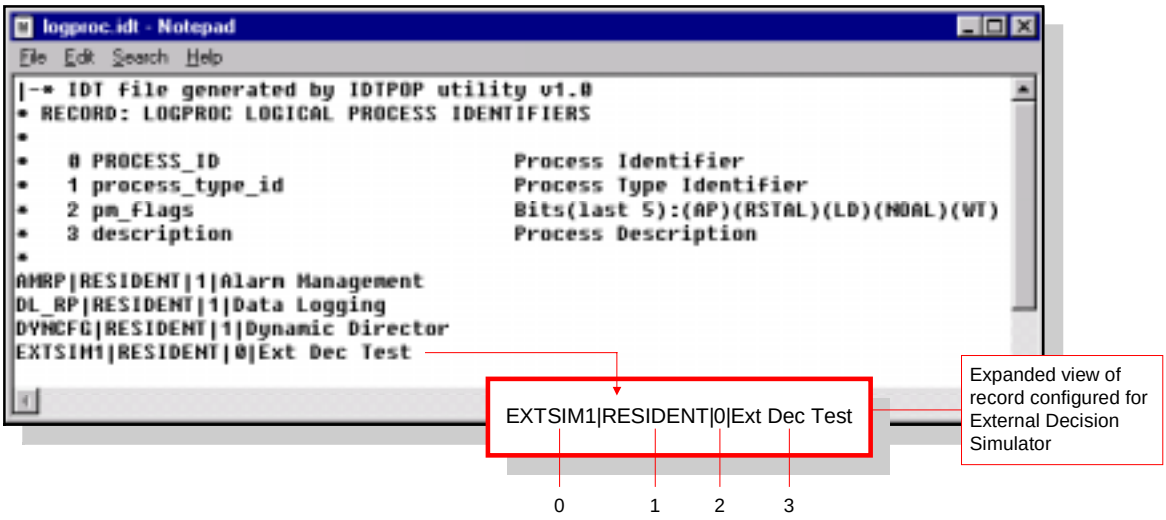
3. Type your record using the following field descriptions:

Field No.	Field Name	Description	Entry Example
0	`node_id`	Node name, always MASTER.	MASTER
1	`process_id`	The name of the logical process that the program will look to for data.	EXTSIM1
2	`object_name`	Object name, same as Process ID.	EXTSIM1
3	`order`	Use default value = 0.	0

4. Save the file.
5. Use the SCPOP Utility to convert file back to binary format.

Step 3. Configure logproc

1. Use the IDTPOP Utility to convert the file to ASCII-text using the text editor of your choice, e.g. Notepad.
2. Press **Ctrl+End** to bring you to the next available line to enter your record—see figure.



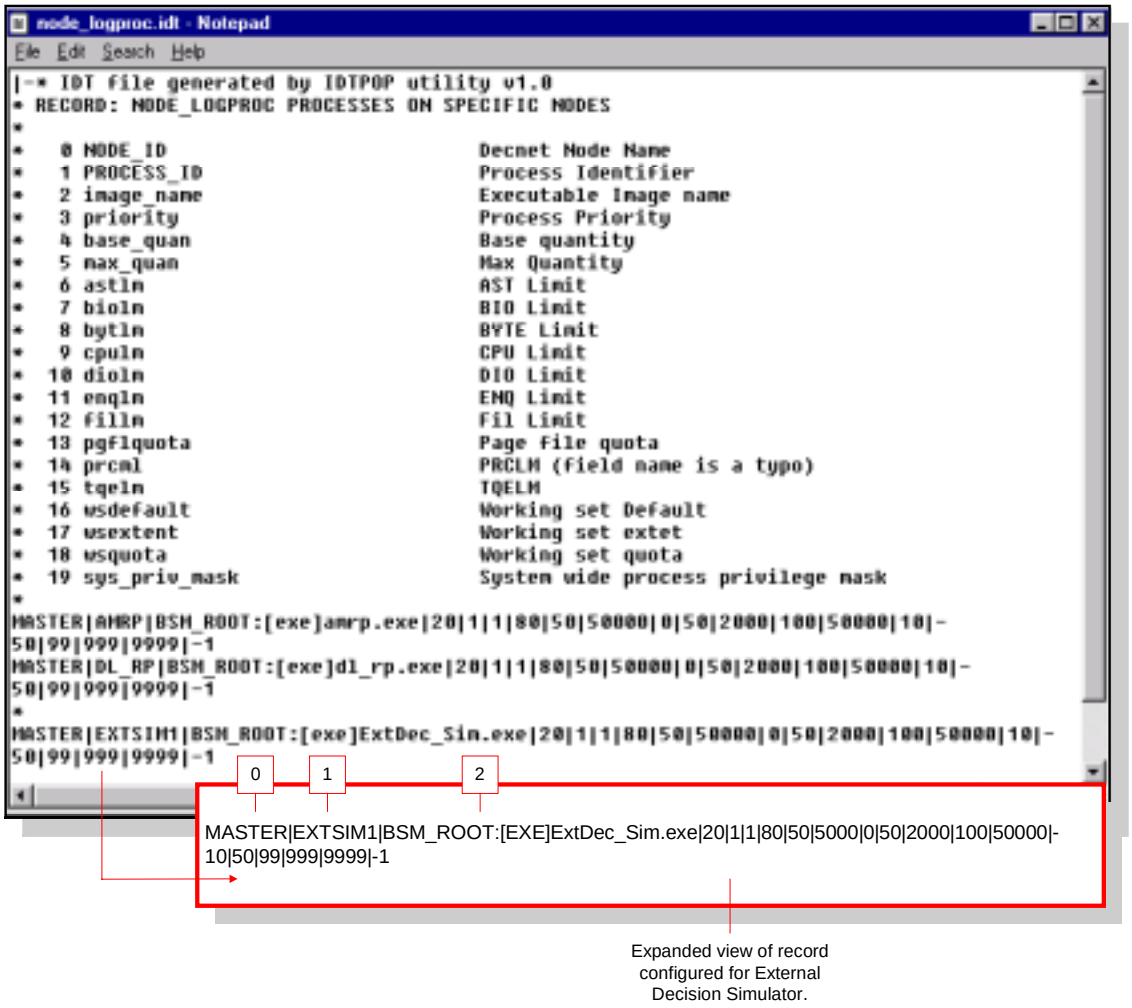
3. Type your record using the following field descriptions:

Field No.	Field Name	Description	Entry Example
0	process_id	The name of the process that the program will look to for data.	EXTSIM1
1	process_type_id	Process type ID; usually RESIDENT process.	RESIDENT
2	pm_flags	Use value = 0.	0
3	description	Description of the process	Ext Dec Test

4. Save the file.
5. Use the SCPOP Utility to convert file back to binary format.

Step 4. Configure node_logproc

1. Use the IDTPOP Utility to convert the file to ASCII-text using the text editor of your choice, e.g. Notepad.
2. Press **Ctrl+End** to bring you to the next available line to enter your record—see figure.


node_logproc.idt - Notepad
File Edit Search Help
|-* IDT file generated by IDTPOP utility v1.0
* RECORD: NODE_LOGPROC PROCESSES ON SPECIFIC NODES
*
* 0 NODE_ID Decnet Node Name
* 1 PROCESS_ID Process Identifier
* 2 image_name Executable Image name
* 3 priority Process Priority
* 4 base_quan Base quantity
* 5 max_quan Max Quantity
* 6 astln AST Limit
* 7 bioln BIO Limit
* 8 bytln BYTE Limit
* 9 cpuln CPU Limit
* 10 dioln DIO Limit
* 11 enqln ENQ Limit
* 12 filln Fil Limit
* 13 pgflquota Page File quota
* 14 prcml PRCLM (field name is a typo)
* 15 tqeln TQELM
* 16 wsdefault Working set Default
* 17 wsextent Working set extet
* 18 wsquota Working set quota
* 19 sys_priv_mask System wide process privilege mask
*
MASTER|AMRP|BSM_ROOT:[exe]amrp.exe|20|1|1|80|50|50000|0|50|2000|100|50000|10|-
50|99|999|9999|-1
MASTER|DL_RP|BSM_ROOT:[exe]dl_rp.exe|20|1|1|80|50|50000|0|50|2000|100|50000|10|-
50|99|999|9999|-1
*
MASTER|EXTSIM1|BSM_ROOT:[exe]ExtDec_Sim.exe|20|1|1|80|50|50000|0|50|2000|100|50000|10|-
50|99|999|9999|-1
0
1
2
MASTER|EXTSIM1|BSM_ROOT:[EXE]ExtDec_Sim.exe|20|1|1|80|50|5000|0|50|2000|100|50000|-
10|50|99|999|9999|-1
Expanded view of record configured for External Decision Simulator.

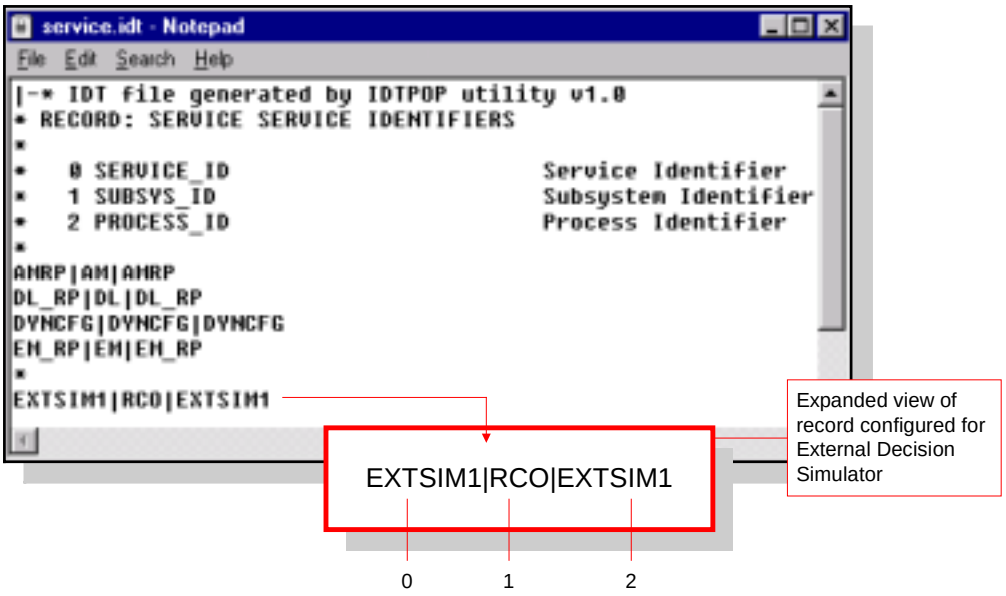
3. For this record you are only concerned with the entries in the first three fields. Use the default values for the remaining fields, which can be found on the sample configuration.

Field No.	Field Name	Description	Entry Example
0	node_id	Node name, always MASTER.	MASTER
1	process_id	The name of the process that the program will look to for data.	EXTSIM1
2	image_name	The name of the executable image. Configure as follows: Directory_name:[exe]prt_inttest.exe	BSM_ROOT:[EXE] ExtDec_Sim.exe

4. Save the file.
5. Use the SCPOP Utility to convert file back to binary format.

Step 5. Configure service

1. Use the IDTPOP Utility to convert the file to ASCII-text using the text editor of your choice, e.g. Notepad.
2. Press **Ctrl+End** to bring you to the next available line to enter your record—see figure.



3. Type your record using the following field descriptions:

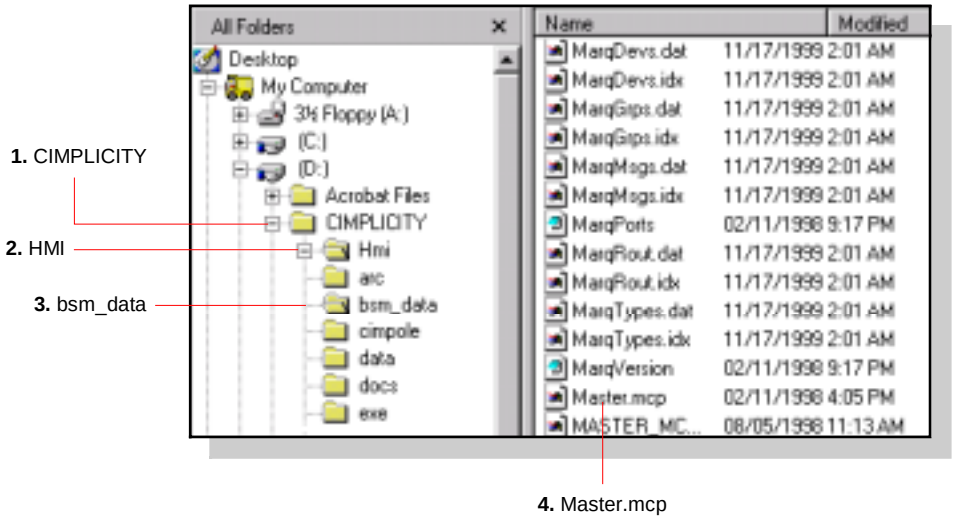
Field No.	Field Name	Description	Entry Example
0	`service_id`	The name given to this service.	EXTSIM1
1	`subsys_id`	The ID of the subsystem, in this case RCO.	RCO
2	`process_id`	The name of the logical process that the program will look to for data.	EXTSIM1

5. Use the SCPOP Utility to convert file back to binary format.

Step 6. Configure master.mcp

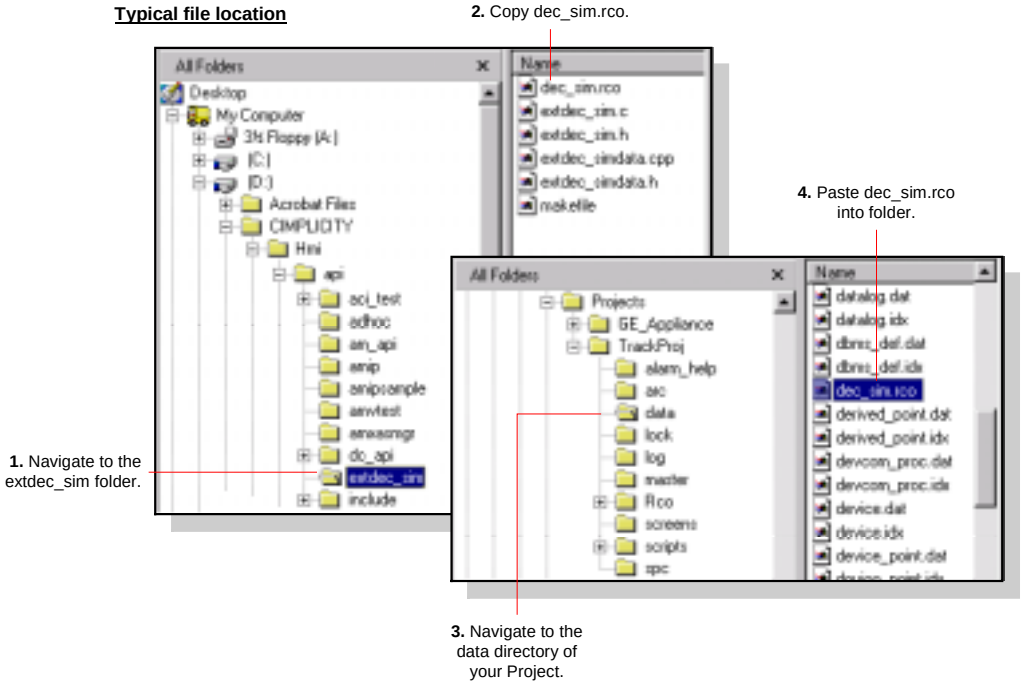
1. Open the Windows Explorer.
2. Navigate to the **`master.mcp`** file in the directory. Typical file location = \CIMPLICITY\HMI\bsm_root.
3. Double-click on the file and open with the text editor of your choice, e.g. Notepad.
4. Press **Ctrl+End** to go to the last line in the file.
5. Enter the name of the logical process, e.g. EXTSIM1.
6. Save the file.

Typical file location



Step 7. Copy Decision Configuration File

1. Open the Windows Explorer.
2. Navigate to the **`ExtDec_sim`** in the directory. Typical file location = \CIMPLICITY\HMI\Api\ExtDec_sim.
3. Copy the **`dec_sim.rco`** file.
4. Navigate to the Data folder in your project directory.
5. Paste the file into your Data folder.



External Decision Buffer

RCO has the ability to handle external decisions provided by external processes through function blocks. This includes requesting and receiving external decisions from external processes, storing these decisions in a buffer, allowing manipulation like append, insert, flush, delete, and execution of these decisions in the decision buffer.

Two new basic objects handle decisions through function blocks as follows:

Object	Holds
`RcoDecisionBuffer`	A list of decisions received for a particular controller location.
`RcoExtDecision`	The decision data of a decision received from external process.

Information regarding external decision function blocks can be found in the "Core Function Blocks" section of this manual. The following have been documented and released:

- Append a Decision in ExtDecBuffer
- Delete a Decision in ExtDecBuffer
- Delete at a Decision in ExtDecBuffer
- Flush the ExtDecBuffer
- Get Ext Decision List
- Insert a Decision in ExtDecBuffer
- Request External Decisions
- Select Next External Decision

RcoDecisionBuffer

Structure of **`RcoDecisionBuffer`** basic object

```
{
 Id                 //Control location id of external decisions.
TrigTime            //Trigger time
Dec_Qty             //Number of decisions in buffer
Error               //Error message returned, if  error occurred
                    during any
//operation on RcoDecisionBuffer fails.
}
```

Methods:

Following methods are available to assign values in object members:

RcoDecisionBuffer.Id= Text //Specifies Control location id

Following methods provide functionality to retrieve values from RcoDecisionBuffer Object:

```
Text                    =   RcoDecisionBuffer. Id
//Specifies Control location id
```

```
Date                    =   RcoDecisionBuffer .TrigTime
//Specifies trigger time

Integer                 =   RcoDecisionBuffer. Dec_Qty  //Specifies
number of decisions in buffer

RcoExtDecision =   RcoDecisionBuffer .DecArray(I)   //Returns
RcoExtDecision at index I

Text                     =   RcoDecisionBuffer. Error   //Error
message returned by Rco if any

                //operation on RcoDecisionBuffer fails.
```

Functions:

Append

Appends a RcoExtDecision basic object in Decision buffer.

Syntax:

RcoDecisionBuffer.id = text //id of control location

Integer = RcoDecisionBuffer .Append(RcoExtDecision)

Return:

RCO_SUCCESS // = 1

RCO_WARNING // = 0

RCO_FAILURE // = 2

Note: If return value is RCO_FAILURE or RCO_WARNING, the Error member of RcoDecisionBuffer will show cause of the error.

Insert

Inserts an RcoExtDecision basic object at a particular index; if the index is more than size of buffer object, it is inserted at the tail. If the index is less than one, it is inserted at the first location.

Syntax:

```
RcoDecisionBuffer.id = text //id of control location

Integer =  RcoDecisionBuffer .Insert(RcoExtDecision, Index
/Integer/)
```

Return:

RCO_SUCCESS // = 1

RCO_WARNING // = 0

RCO_FAILURE // = 2

Note: If return value is RCO_FAILURE or RCO_WARNING, the Error member of RcoDecisionBuffer will show cause of the error.

Delete:

Deletes a decision from the buffer by decision name. If two or more decisions with the same name exist, then the first duplicate decision is deleted.

Syntax:

RcoDecisionBuffer.id = text //id of control location

Integer = RcoDecisionBuffer .Delete(Decision name /Text/)

Return:

RCO_SUCCESS // = 1

RCO_WARNING // = 0

RCO_FAILURE // = 2

Note: If return value is RCO_FAILURE or RCO_WARNING, the Error member of RcoDecisionBuffer will show cause of the error.

`DeleteAt`

Deletes a decision from buffer at a particular index.

Syntax:

```
RcoDecisionBuffer.id = text  //id of control location
Integer = RcoDecisionBuffer .DeleteAt( Index /Integer/)
```

Return:

RCO_SUCCESS // = 1

RCO_WARNING // = 0

RCO_FAILURE // = 2

Note: If return value is RCO_FAILURE or RCO_WARNING, the Error member of RcoDecisionBuffer will show cause of the error.

`Flush`

Deletes all the decisions from decision buffer.

Syntax:

```
RcoDecisionBuffer.id = text  //id of control location
Integer = RcoDecisionBuffer . Flush ()
```

Return:

RCO_SUCCESS // = 1

RCO_WARNING // = 0

RCO_FAILURE // = 2

Note: If return value is RCO_FAILURE or RCO_WARNING, the Error member of RcoDecisionBuffer will show cause of the error.

`GetDecisions`

Gets the list of external decisions from RCO and stores them in order to populate itself with the data.

Syntax:

RcoDecisionBuffer.id = text //id of control location

Integer = RcoDecisionBuffer . GetDecisions ()

Return:

RCO_SUCCESS // = 1

RCO_WARNING // = 0

RCO_FAILURE // = 2

Note: If return value is RCO_FAILURE or RCO_WARNING, the Error member of RcoDecisionBuffer will show cause of the error.

`RequestDecisions`

Request a particular number of decisions from external process.

Syntax:

RcoDecisionBuffer.id = text //id of control location

Integer = RcoDecisionBuffer . RequestDecisions (project name/external process name /Text/, Decision

attribute /Text/, Number of decisions /Integer/)

Note: Project name and process name should be passed as single string separated by "/"; however, if the process belongs to the local project, the process name is sufficient.

Return:

RCO_SUCCESS // = 1

RCO_WARNING // = 0

RCO_FAILURE // = 2

Note: If return value is RCO_FAILURE or RCO_WARNING, the Error member of RcoDecisionBuffer will show cause of the error.

`SelectNextDecision`

Selects a (first) decision from the decision buffer and executes when configured in RCOSite). If the decision is not configured in RCOSite, then it is not get executed and an error returns. Moreover, calling this function will also remove the first decision from buffer, so next call will execute next decision. If there are no decisions left in buffer then it returns an error stating there are no decisions left. A RequestDecisions call is required to be called once decision buffer empties, to execute more decisions.

Syntax:

```
RcoDecisionBuffer.id = text  //id of control location
Integer = RcoDecisionBuffer . SelectNextDecision ()
```

Return:

RCO_SUCCESS // = 1

RCO_WARNING // = 0

RCO_FAILURE // = 2

Note: If return value is RCO_FAILURE or RCO_WARNING, the Error member of RcoDecisionBuffer will show cause of the error.

RcoExtDecision

RcoDecisionBuffer contains the array of RcoExtDecision objects

```
Structure
{
Dec_Name      //Text
Dec_Attr      //Text
Req_flag      //Integer
}
```

Methods:

This object has following methods to get and set the properties:

Get Methods:

```
RcoExtDecision. Dec_Name    =      Text
RcoExtDecision. Dec_Attr           =     Text
RcoExtDecision. Req_flag           =     Integer
```

Set Methods:

```
Text    =     RcoExtDecision. Dec_Name
Text    =     RcoExtDecision. Dec_Attr
Integer        =     RcoExtDecision. Req_flag
```

Index

A

About
  Function blocks, Routing Control Objects 6-1
  Routing control objects 2-1
  Routing Control Objects 1-1
Accessing
  RCO configuration wizard 3-3
Add PRT Item
  PRT function blocks 12-1
Add Sites to Profile
  RCO user interface 4-16
Additional Functions & Utilities
  RCO configuration wizard 3-37
Alarming and Logging
  Tracker Configuration user interface 3-44
Alarming Options
  Tracker Configuration user interface 3-45, 3-47
API Calls
  RCO external decision A-9
Append a Decision in ExtDecBuffer
  Core function blocks 8-1
Associate Item
  PRT function blocks 12-2
Attribute Counts
  Output blocks 9-1
Attribute Maintenance
  RCO configuration wizard 3-39

B

Balance Load
  Routing function blocks 7-1
Basic Control Engine Scripts 3-21
BCE 3-21
Block by Attribute
  Routing function blocks 7-4

C

Case Block
  Conditional function blocks 10-1
Case Else Block
  Condition function blocks 10-2
Check All Region's (related to decisions) Status
  Conditional function blocks 10-4
Check All Region's (related to decisions) Status Extended
  Conditional function blocks 10-2
Check if any Source Region has Decision
  Condition function blocks 10-5
Check Item Hold Status
  Routing function blocks 7-6
Check Process Capability
  Routing function blocks 7-10
Check Region Full
  Routing function blocks 7-13
Check Region Ready
  Routing function blocks 7-14
Clear the Cached Items
  Core function blocks 8-1
Compare Attribute with Attribute
  Condition function blocks 10-6
Compare Attribute with Point
  Condition function blocks 10-9
Compare Attribute with Value
  Condition function blocks 10-11
Compare Point with Point
  Condition function blocks 10-13
Compare Point with Value
  Condition function blocks 10-15
Compare RCO Variables
  Condition function blocks 10-17
Condition Function Blocks
  Case block 10-1
  Case else block 10-2
  Check if any source region has decision 10-5
  Compare attribute with attribute 10-6
  Compare attribute with point 10-9
  Compare attribute with value 10-11
  Compare point with point 10-13
  Compare point with value 10-15
  Compare RCO variables 10-17
  Else block 10-19
  End if 10-20
  End select block 10-20
  End while 10-21
  While (expression) 10-25
Conditional Alarm with Attribute
  Output blocks 9-3
Conditional Alarm with Point
  Output blocks 9-3
Conditional Function Blocks

Check all region's (related to decisions) status 10-4
Check all region's (related to decisions) status extended 10-2
Else if (expression) 10-19
If (expression) 10-21
Select block 10-23
Configuration Data, Saving
Tracker Configuration user interface 3-36
Configuration Files
RCO logging configuration 5-3
Configure Profile
RCO user interface 4-15
Configure Settings for Profile
RCO user interface 4-17
Configuring Output Module 3-15
Connect to Local Project
RCO user interface 4-2, 4-16
Connect to Projects from the Command Line
RCO user interface 4-5
Connect to Projects in Existing RCO Profile
RCO user interface 4-4
Connect to the Configuration Dialog
RCO user interface 4-7
Consume a Trigger
Core function blocks 8-2
Routing function blocks 7-17
Control Site
Routing control objects 2-2
Control Site Data
RCO user interface 4-11
Control Site Search
RCO User Interface 4-30
Core Function Blocks
Append a decision in ExtDecBuffer 8-1
Clear the cached items 8-1
Consume a trigger 8-2
Custom block 8-2
Delete a decision in ExtDecBuffer 8-4
Delete at a Decision in ExtDecBuffer 8-3
Exit sub 8-4
Fill array point 8-5
Fill RCO array point 8-5
Flush the ExtDecBuffer 8-6
Get decision attribute 8-6
Get Decision Status 8-7
Get Ext Decision 8-7
Get production Data 8-7
Increment attribute 8-8
Increment point 8-8
Insert a decision in ExtDecBuffer 8-9
Logstatus generator 8-9
Region full check 8-10
Request external decisions 8-10
Reset a Trigger 8-11
Select next external decision 8-11
Set array point 8-12
Set Attribute 8-12
Set Attribute to Text and Integer 8-12
Set attribute with attribute 8-13
Set attribute with point 8-14
Set Attribute with RCO Variable 8-14
Set attribute with value 8-14
Set auto-trigger interval 8-14
Set decision attribute 8-15
Set Decision Status 8-16
Set point with attribute 8-17
Set point with point 8-17
Set point with timestamp 8-18, 8-22
Set point with value 8-18
Set RCO Variable with a Special Value 8-22
Set RCO variable with attribute 8-19
Set RCO variable with expression 8-21
Set RCO variable with point 8-21
Set RCO variable with translate value 8-23
Set RCO variable with value 8-24
Set RCO variable with value extended 8-24
Set wait encountered flag 8-25
Create New Output Module
Tracker Configuration user interface 3-15, 3-17
Create New Profile
RCO user interface 4-16
Create RCO Profile Using Text Editor
RCO user interface 4-18
Creating Routing Control Objects 3-7
Custom Block
Core function blocks 8-2

D

Data Management Functions
RCO external decision A-7
Data Source Control Objects 3-4
Data_field.idt
RCO logging configuration 5-4
Database Logger Table Fields
RCO logging configuration 5-1
Database logger tables
RCO logging configuration 5-1
Datalog.idt
RCO logging configuration 5-3
Datasource Iinformation
Tracker Configuration user interface 3-3
Decisions
Routing control objects 2-4
Tracker Configuration user interface 3-28
Definition
RCO configuration 2-12

Definitions
Folders 2-11
Function blocks 2-11
Merge route 2-11
Output logic 2-11
RCO 2-11
RCO Decisions 2-11
RCO triggers 2-12
RLM 2-12
Route 2-11
Routing control objects 2-11
Routing logic 2-12
Routing logic module 2-12
Simple route 2-12
Splerge route 2-12
Split route 2-12
Synchronous validation 2-12
Delete a Decision in ExtDecBuffer
Core function blocks 8-4
Delete at a Decision in ExtDecBuffer
Core function blocks 8-3
Delete Default Site from Profile
RCO user interface 4-17
Delete Items
PRT function blocks 12-4
Diagnostic Function Blocks
Dump Available Decisions 11-1
Site Log Generator 11-2
Disassociate Items
PRT function blocks 12-4
Dump Available Decisions
Diagnostic function blocks 11-1

E

Eliminate by Increasing Weight Percentages
Routing function blocks 7-35
Eliminate by Weight
Routing function blocks 7-18
Eliminate Decision
Routing function blocks 7-43
Eliminate Decision based On rule
Routing function blocks 7-22
Eliminate Decision by Attribute Attribute
Routing function blocks 7-28
Eliminate Decision by Attribute Point
Routing function blocks 7-31
Eliminate Decision by Attribute Value
Routing function blocks 7-33
Eliminate Decision by Point Point
Routing function blocks 7-38
Eliminate Decision by Point Value
Routing function blocks 7-40
Eliminate Decision if not only Decision
Routing function blocks 7-42
Eliminate Decisions Based on Attribute Spacing
Routing function blocks 7-19
Eliminate Decisions with No Items in Source
Routing function blocks 7-44
Else Block
Condition function blocks 10-19
Else if (expression)
Conditional function blocks 10-19
End if
Condition function blocks 10-20
End Select Block
Condition function blocks 10-20
End While
Condition function blocks 10-21
Error List Utility
Tracker Configuration user interface 3-43
Event Handler Functions
RCO external decision A-7
Execution Sequence
Routing Control Objects 3-2
Exit Sub
ore function blocks 8-4
ExtDec_api_get_msg A-3
ExtDec_api_init A-2
ExtDec_api_init_comm A-4
ExtDec_api_send_decision A-4
ExtDec_api_term A-5
External Decision Buffer
RCO external decision A-17
External Decision Simulator A-6

F

Fill Array Point
Core function blocks 8-5
Fill RCO Array Point
Core function blocks 8-5
Flush the ExtDecBuffer
Core function blocks 8-6
Folders
Definition 2-11
Framework Functions
RCO external decision A-6
Function Blocks
Definition 2-11
Routing Control objects 6-1

G

Generate Alarm
Output blocks 9-4
Get Decision Attribute
Core function blocks 8-6
Get Decision Status
Core function blocks 8-7

Get Ext Decision
Core function blocks 8-7
Get Production Data
Core function blocks 8-7
Get Trigger Name
Routing function blocks 7-46
Global Library 3-37
Glossary
Routing control objects 2-11

I

If (expression)
Conditional function blocks 10-21
Include File
Include function blocks 13-1
Include Function Blocks
Include file 13-1
Increment Attribute
Core function blocks 8-8
Increment Point
Core function blocks 8-8
Insert a Decision in ExtDecBuffer
Core function blocks 8-9
Item Type Translation
Routing function blocks 7-47

L

Launch the RCO User Interface 4-2
Load Existing Profile
RCO user interface 4-16
Load PRT Item into Item Variable
PRT function blocks 12-5
Load PRT Region Data into Region Variable
PRT function blocks 12-5
Locking Operation
Tracker Configuration user interface 3-35
Log Destination Options
Tracker Configuration user interface 3-46
Logstatus Generator
Core function blocks 8-9
Look back blocking
Routing function blocks 7-48

M

Manual Decisions
RCO user interface 4-23
Manually Create an RCO Profile
RCO user interface 4-18
Menu Bar
RCO user interface 4-12
Merge Route
Definition 2-11
Move Item
PRT function blocks 12-6

O

Open Profile
RCO user interface 4-14
Output Blocks
Attribute Counts 9-1
Conditional alarm with attribute 9-3
Conditional alarm with point 9-3
Generate alarm 9-4
Process bits & words 9-5
Set Asynch Validation value 9-6
Update counts 9-7
Update spacing, attribute and total released counts 9-10
Output Logic
Definition 2-11
Output Module
Create new 3-15, 3-17
Predefined 3-20
Output Module, Creating
Tracker Configuration user interface 3-15
Overview
RCO external decision A-1
RCO logging configuration 5-1
RCO user interface 4-1
Tracker Configuration user interface 3-5

P

Popup Menu
RCO user interface 4-13
Predefined Output Module 3-20
Process Bits & Words
Output blocks 9-5
Process Flowchart
RCO external decision A-9
Production Tracking Window
Print Reports 7-35
PRT Function Blocks
Add PRT item 12-1
Associate Item 12-2
Delete items 12-4
Disassociate items 12-4
Load PRT item into item variable 12-5
Load PRT region data into region variable 12-5
Move item 12-6
Set PRT item data 12-7
Set PRT item with another PRT item 12-8
Set source region as decision made 12-10

R

RCO
  Definition 2-11
RCO Decisions
  Definition 2-11
RCO External Decision
  API calls A-9
  API functions A-2
  Data management function A-7
  Event handler function A-7
  ExtDec_api_get_msg A-3
  ExtDec_api_init A-2
  ExtDec_api_init_comm A-4
  ExtDec_api_send_decision A-4
  ExtDec_api_term A-5
  External decision buffer A-17
  External decision simulator A-6
  Framework functions A-6
  Overview A-1
  Process flowchart A-9
  RCODecisionBuffer A-17
  RCOExtDec API calls to PDC_API calls A-5
  RCOExtDecision A-21
  Simulator configuration requirements A-10
RCO Folder Properties
  Global library 3-37
  RCO configuration wizard 3-37
  Thread count 3-37
RCO Logging Configuration
  Configuration files 5-3
  Data_field.idt 5-4
  Database logger table fields 5-1
  Database logger tables 5-1
  Datalog.idt 5-3
  Overview 5-1
RCO Routing Logic
  Definition 2-12
RCO UI Window 4-10
RCO User Interface
  Add sites to profile 4-16
  Configure profile 4-15
  Configure settings for profile 4-17
  Connect to local project 4-2, 4-16
  Connect to projects from the command line 4-5
  Connect to projects in Existing RCO profile 4-4
  Connect to the Configuration dialog 4-7
  Control site data 4-11
  Control site search 4-30
  Create new profile 4-16
  Create RCO profile using text editor 4-18
  Delete default site from profile 4-17
  Launching 4-2
  Load existing profile 4-16
  Manual decisions 4-23
  Manual Triggering 4-28
  Manually create an RCO profile 4-18
  Menu bar 4-12
  Open profile 4-14
  Overview 4-1
  Popup menu 4-13
  Resetting Triggers 4-29
  Save configured profile 4-17
  Select control site 4-9
  Set default site for profile 4-16
  Status bar 4-10
  Status field 4-10
  Toolbar 4-11
  Triggering, Manual 4-28
  Triggers 4-26
  Triggers, Resetting 4-29
  Valid control site decisions 4-23
  Window 4-10
RCODB_RP Process
  Routing control objects 2-10
RCODecisionBuffer
  RCO external decision A-17
RCOExtDec API Calls to PDC_API Calls A-5
RCOExtDecision
  CO external decision A-21
Region Full Check
  Core function blocks 8-10
Region Maintenance
  RCO configuration wizard 3-40
Requent External Decisions
  Core function blocks 8-10
Reset a Trigger
  Core function blocks 8-11
RLM
  Definition 2-12
Route
  Definitions 2-11
Routing Configuration Wizard
  Additional functions & utilities 3-37
  Attribute maintenance 3-39
  RCO folder properties 3-37
  Region maintenance 3-40
Routing Control Objects
  About 1-1, 2-1
  Control site 2-2
  Creating 3-7
  Data source 3-4
  Decisions 2-4
  Definitions 2-11
  Execution sequence 3-2
  Function blocks 6-1
  Glossary 2-11
  RCO user interface 4-10
  RCODB_RP process 2-10
  Tracker Configuration user interface 3-1
  Triggers 2-3

Routing Function Blocks
Balance load 7-1
Block by attribute 7-4
Check item hold status 7-6
Check process capability 7-10
Check region full 7-13
Check region ready 7-14
Consume a Trigger 7-17
Eliminate by increasing weight percentages 7-35
Eliminate by weight 7-18
Eliminate decision 7-43
Eliminate decision based On rule 7-22
Eliminate decision by attribute attribute 7-28
Eliminate decision by attribute point 7-31
Eliminate decision by attribute value 7-33
Eliminate decision by point point 7-38
Eliminate decision by point value 7-40
Eliminate decision if not only decision 7-42
Eliminate decisions based on attribute spacing 7-19
Eliminate decisions with no items in source 7-44
Get Trigger Name 7-46
Item type translation 7-47
Look back blocking 7-48
Select decision by attribute point 7-50
Select decision by attribute value 7-53
Select decision by point value 7-55
Select decision with highest order & weight 7-57
Select highest order decision 7-59
Select lowest order decision 7-60
Select most empty region 7-61
Select most full region 7-62
Select next highest order decision 7-63
Select oldest item 7-64
Set point with timestamp 7-58
Routing Logic Module
Definition 2-12

S

Save Configured Profile
RCO user interface 4-17
Select Block
Conditional function blocks 10-23
Select Control Site
RCO user interface 4-9
Select Decision by Attribute Point
Routing function blocks 7-50
Select Decision by Attribute Value
Routing function blocks 7-53
Select Decision by Point Value
Routing function blocks 7-55
Select Decision with Highest Order & Weight
Routing function blocks 7-57
Select Highest Order Decision
Routing function blocks 7-59
Select Lowest Order Decision
Routing function blocks 7-60
Select Most Empty Region
Routing function blocks 7-61
Select Most Full Region
Routing function blocks 7-62
Select Next External Decision
Core function blocks 8-11
Select Next Highest Order Decision
Routing function blocks 7-63
Select Oldest Item
Routing function blocks 7-64
Set Array Point
Core function blocks 8-12
Set Asynch Validation Value
Output blocks 9-6
Set Attribute
Core function blocks 8-12
Set Attribute to Text and Integer
Core function blocks 8-12
Set Attribute with Attribute
Core function blocks 8-13
Set Attribute with Point
Core function blocks 8-14
Set Attribute with RCO Variable
Core function blocks 8-14
Set Attribute with Value
Core function blocks 8-14
Set Auto-Trigger Interval
Core function blocks 8-14
Set Decision Attribute
Core function blocks 8-15
Set Decisions Status
Core function blocks 8-16
Set Default Site for Profile
RCO user interface 4-16
Set Point with Attribute
Core function blocks 8-17
Set Point with Point
Core function blocks 8-17
Set Point with Timestamp
Core function blocks 8-18, 8-22
Routing Function Blocks 7-58
Set Point with Value
Core function blocks 8-18
Set PRT Item Data
PRT function blocks 12-7
Set PRT Item with another PRT Item
PRT function blocks 12-8
Set RCO Variable with a Special Value
Core function blocks 8-22
Set RCO Variable with Attribute
Core function blocks 8-19
Set RCO Variable with Expression
Core function blocks 8-21

Set RCO Variable with Point
Core function blocks 8-21
Set RCO Variable with Translate Value
Core function blocks 8-23
Set RCO Variable with Value
Core function blocks 8-24
Set RCO Variable with Value Extended
Core function blocks 8-24
Set Source Region as decision Made
PRT function blocks 12-10
Set Wait Encountered Flag
Core function blocks 8-25
Simple Route
Definitions 2-12
Simulator Configuration Requirements
RCO external decision A-10
Site Log Generator
Diagnostic function blocks 11-2
Splerge Route
Definitions 2-12
Split Route
Definitions 2-12
Status Bar
RCO user interface 4-10
Status Field
RCO user interface 4-10
Synchronous Validation0
Definitions 2-12

T

Thread Count 3-37
Toolbar
RCO user interface 4-11
Tracker Configuration
Definition 2-12
Tracker Configuration User Interface
Accessing 3-3
Alarming and logging 3-44
Alarming options 3-45, 3-47
Basic control enging scripts 3-21
Configuration data, saving 3-36
Configure decisions 3-28
Create new output module 3-15
Creating routing control objects 3-7
Entering datasource information 3-3
Error list utility 3-43
Locking operation 3-35
Log destination options 3-46
Output module, Creating 3-15
Overview 3-5
Predefined output module 3-20
Routing Control Objects 3-1
Triggers, configuring 3-25
Upgrading RCO projects 1-2
Verify utility 3-43
View RCO alarms in Workbench 3-45
Tracker Configuration User Interface Wizard
Create new output module 3-17
Triggering Manual
RCO User Interface 4-28
Triggers
RCO User Interface 4-26
Routing control objects 2-3
Tracker Configuration user interface 3-25
Triggers Reset
RCO User Interface 4-29
Triggers, RCO
Definition 2-12

U

Update Counts
Output blocks 9-7
Update Spacing, Attribute and Total Released Counts
Output blocks 9-10
Upgrading RCO Project 1-2

V

Valid Control Site Decisions
RCO User Interface 4-23
Verify Utility
Tracker Configuration user interface 3-43
View RCO Alarms in Workbench
Tracker Configuration user interface 3-45

W

While (expression)
Condition function blocks 10-25